ADVISORY COMMITTEE PUBLIC MEETING

BEFORE THE

CALIFORNIA ENERGY RESOURCES CONSERVATION

AND DEVELOPMENT COMMISSION

In the Matter of:	)
	)
California Climate Change	) Docket No.
Advisory Committee,	) 04-CCAC-1
Quarterly Meeting	)
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PACIFIC GAS AND ELECTRIC COMPANY

851 HOWARD STREET

CONFERENCE CENTER

SAN FRANCISCO, CALIFORNIA

TUESDAY, JANUARY 18, 2005

9:41 A.M.

Reported by:
Peter Petty
Contract No. 150-04-002

CEC COMMISSIONERS PRESENT

James Boyd

CEC STAFF PRESENT

Susan Brown

Tim Olson

CCCAC MEMBERS PRESENT

Ralph Cavanagh
Natural Resources Defense Council

Peggy Duxbury
Calpine Corporation

Cynthia Cory
California Farm Bureau

Michael Hertel
Southern California Edison Company

Ben Knight
Honda R&D Americas

Jason Mark
Union of Concerned Scientists

Michael Meacham
City of Chula Vista

Denise Michelson
bp West Coast Products

Robert Parkhurst
Hewlett Packard
also representing Silicon Valley Manufacturing Group

Wendy Pulling
Pacific Gas and Electric Company

Jan Schori
Sacramento Municipal Utility District

CCCAC MEMBERS PRESENT

Stephen Schneider
Stanford University

Michael Mastrandrea
Alternate for Dr. Schneider

John Shears
Center for Energy Efficiency and Renewable Technologies

Abby Young
International Council for Local Environmental Initiatives

ALSO PRESENT

H.I. Bud Beebe
Sacramento Municipal Utility District

Greg San Martin
Pacific Gas and Electric Company

Dan Adler
California Public Utilities Commission

Doug Wickizer
California Department of Forestry and Fire Protection

Molly Sterkel
ICF Consulting

Mike Burnett
The Climate Trust

Nancy Skinner
The Climate Group

Dara Salour
RCM Digesters, Inc.

Louis Blumberg
The Nature Conservancy

Michael Lazarus
Tellus Institute

ALSO PRESENT

Lainie Motamedi
California Public Utilities Commission

Ned Helme
Center for Clean Air Policy

David Wagger
Center for Clean Air Policy

Diane Wittenberg
California Climate Action Registry

Stacey Davis
Center for Clean Air Policy

Eileen Wenger Tutt
California Air Resources Board

I N D E X

I N D E X

P R O C E E D I N G S

9:41 a.m.

COMMISSIONER BOYD: The timing having arrived. Now, Wendy, I think the clock on the wall is just a tad fast, or is it?

MS. PULLING: Yes.

COMMISSIONER BOYD: Or am I slow? I'm not --

MS. PULLING: We must have had a power surge.

(Laughter.)

COMMISSIONER BOYD: Okay. Well, good morning, everybody, and welcome to this, the third meeting of the California Climate Advisory Committee. And thanks to our host, Wendy Pulling, PG&E for having us here, for the use of their facilities.

Those of us who drove from Sacramento found it no problem at all, but it sure helps to have a carpool, use the diamond lane.

In any event, I appreciate everyone's being here. I know there's a few of you who, like all the rest of us, it's hard to find any time on a calendar. And I know some of you made a great sacrifice to be here and turn around and speed to something else at either noon or early afternoon. But we'll try to move this along so everyone can at least get as much as we can out of the day.

I think I just want to make reference to the purpose of the Committee. The Advisory Committee was formed, as you all recall, in July of last year in response to legislation that empowered the Energy Commission to establish such an Advisory Committee. And the charge of that statute was for the Committee to make recommendations to the Energy Commission on the most equitable and efficient way to implement national and international climate change requirements. And that's what we've been focusing on in our previous two meetings, trying to fill the bin, let me say, with strategies that might be applicable to California, based on the lessons learned elsewhere in the world.

California's done a lot and some of us look forward to California doing a lot more. While the Administration has not made any public pronouncements on the subject of any climate change initiatives, we remain hopeful. And we certainly have not been discouraged at all. So, we're going to continue to press on.

And I would like to welcome, hearing the phone, welcome those folks out there who are listening in to this. And I hope you can hear what's being said today. I am holding the one and only traveling mike, which will have to travel around this table. The mikes you see here on the table are for the reporter's tape, who's going to make the record for us, so I don't believe they project through the system, only to his recording device.

So when we speak I'm going to have to pass this around or at the lectern has a microphone.

I'm going to try not to talk very much this morning because we have an extremely full agenda and our October meeting we received extensive feedback from the Committee and the comments are reflected in the meeting summary, which was prepared by Energy Commission Staff and distributed. And I think more copies are available in the back on the shelf back there.

Following the October meeting the staff had a series of conference calls with Committee members to solicit input on the various priority topics that were identified either in that meeting or in subsequent calls. And this input is being reflected in the progress reports we're going to hear today. And particularly in the report from Ned Helme on the measures proposed for analysis.

As in the past we continue to collaborate very closely within state government with all the other agencies who have an interest and a role in climate change. The members of the long-standing joint agency climate change team, in particular with our friends at Cal-EPA. And new Secretary Lloyd and I go way way back, so I expect very close liaison between us on this subject. I've talked to him a couple times already, as hard as he is to get ahold of now in his new capacity.

And, of course, we've had a long-standing partnership with the Climate Action Registry and Diane Wittenberg will be with us, if she's not out there now, with us to speak. And she's going to be our working lunch speaker.

As you know, the law requires that the meetings of the Committee be open to the public, and so I welcome, very much welcome the public, and it should be public meetings. And we provided some time on the agenda at the end of the day for some public comment, around 3:00 if not sooner.

As I indicated, the meeting is being taped, and there will be a transcript. And therefore we ask, and the court reporter definitely needs, for you to please identify yourself for the record before you speak. And if you are a speaker or have something to say, if sometime during the day you can slip him a business card, it helps him correlate faces and what's on his tape recorder, and making a transcript.

We have a telephone number listed on the notice and so those outside will be able to call in questions, if they're so inclined, during the question period.

And at the end of the day, of course, we'll have to think a little bit about when our next meeting is, and where it might be. We're thinking roughly April, but just toss that on the table for thought for later.

What I'm hoping we'll be able to produce by the end of the day today is, or get from you is just continued feedback as we have before on the formulation of priority lists and strategies which would be presented to us by folks who tell us we've worked with on the Western Governors and the

Center for Clean Air Policy is working directly for us on this issue. We'll get some feedback from them. I'd like some feedback from you all as we formulate where we're going in the future.

The only thing I'm going to say in addition before turning this over to Susan Brown to catch us up a little bit on current activity, let me say, involving other state agencies, and we're going to specifically call on the PUC, with whom we are beginning to very closely partner on lots of things, including climate change.

I just want to reiterate something I know Susan was going to touch on, or is going to touch on, is the importance of this work to the Commission. One of the forums that has been created, almost a permanent forum for us, is the Integrated Energy Policy Report.

In 2003 we did our first ever such report and discussed climate change. We're supposed to do this report completely over every two years. We're well into working on the 2005 report. Those of you who follow us saw there was a 2004 update where we picked three specific topic areas to elaborate more on in the interim period. And gave a little progress against plan on all the issues in our first report.

We've definitely highlighted climate change in the 2005 report. We've had at least one public hearing. We plan public hearings, they seem to be perpetual, almost daily, on all the various, a large variety of subjects that the Energy Commission is concerned with.

So, this advisory group is going to prove to be extremely important to us. And at some point in time I see an intersection between the meetings we have and the public workshops and public committee hearings we have at the Commission on the IEPR, as we call it. And I look forward to the work product of this group feeding into that report. And I look forward to maybe, as I said, an intersection sometime where this group can meet in conjunction with (inaudible) and we can share information.

But I just want to highlight that as a very key and public document and series of events that will allow us to highlight this subject as well as a lot of others.

With that, I'm going to turn the microphone now over to Susan who is going to just give us some background on most the things the state is engaged in before we call specifically on the PUC and then move into the agenda.

And one of the items we're hearing today, of course, we'll hear from Ralph Cavanagh, a participant in the very recent report by the National Commission on Energy Policy, which I found to be a very interesting and well done report on the general subject. It has a lot of climate change activity in it.

So, again, welcome, everybody; good morning, again. Thank you, Wendy. And, Susan, it's yours.

MS. BROWN: Thank you very much, Commissioner Boyd, and thank you all for being here. Peggy, did you want something or --

MS. DUXBURY: I was wondering if for the sake of the audience, do we want to go around the room and just introduce ourselves real quickly? Does everybody know who we --

COMMISSIONER BOYD: We can -- that's not a bad idea. We're getting bigger, but if we could quickly go around the room and have folks introduce themselves.

Hopefully everybody in the audience -- well, you can't all see the name tags, because you've got your back to the audience. So, maybe we should go around the table first and then just move on out into the audience. And, Abby, why don't we just start with you.

MS. YOUNG: Thank you. And I apologize for coming in a few minutes later. I'm Abby Young; I am with the ICLEI, the International Council for Local Environmental Initiatives. We work with cities and counties in the US and around the world to do global warming work.

DR. SCHNEIDER: Steve Schneider from Stanford University. My colleague is Mike Mastrandrea who will take over for me after lunch. And I work on what's called integrated assessment. That's the combination of what people do to affect climate, what it might mean.

From the science side, impacts, as well as cost and benefits of alternatives to deal with it.

MS. PULLING: Good morning; I'm Wendy Pulling; I work at Pacific Gas and Electric Company. And I want to just take a moment to welcome you all to the Pacific Energy Center. If you have a few minutes at lunch, or some other time during the day I really encourage you to walk around and take a look at some of the displays and exhibits we have on energy efficiency, which, of course, is very much in keeping with our work here on the Climate Change Advisory Committee, since energy efficiency is one of the premiere ways that not only Californians, but Americans, and even internationally we can all work to reduce greenhouse gas emissions.

So this Center is one that we've operated since the early '90s, and provides free training to architects and HVAC specialists, lighting specialists in energy efficient design. It's funded by all of us Californians.

And, again, we welcome you here, and hopefully we'll have an inspiring meeting.

COMMISSIONER BOYD: Thank you, Wendy. I'm Jim Boyd, Commissioner with the Energy Commission. Again, my thanks to Wendy; and she's right, efficiency is job one in all three legs of the energy stool, as I like to say. And appreciate you hosting us at this facility. And there are lessons to be learned out there.

I got here a little early, so was making sure everything I'd done at home fits with your display out there. I got to do some more.

MS. CORY: Cynthia Cory with the California Farm Bureau.

MR. PARKHURST: Robert Parkhurst with Hewlett Packard. And I'm also here representing the Silicon Valley Manufacturing group where I am coChair of their environmental committee.

MR. HERTEL: Mike Hertel with Southern California Edison.

MR. KNIGHT: Ben Knight with Honda R&D Americas, and I work towards cleaner, more efficient and alternatively fueled vehicles.

MR. SHEARS: John Shears with CEERT. I'm one of the two science people, along with Dr. Rich Ferguson, who works -- CEERT on the science aspects.

MS. DUXBURY: I'm Peggy Duxbury with Calpine Corporation.

MR. MARK: Jason Mark, Union of Concerned Scientists.

MR. MEACHAM: Michael Meacham with the City of Chula Vista.

MR. CAVANAGH: Ralph Cavanagh, the Natural Resources Defense Council.

MS. MICHELSON: Good morning, Denise Michelson with bp West Coast Products.

MS. SCHORI: Good morning; Jan Schori, Sacramento Municipal Utility District.

MS. BROWN: I think that's it for the members, right? Did we miss anyone?

COMMISSIONER BOYD: Well, I think we were going to go around the audience and let everybody introduce themselves.

MS. BROWN: Okay.

COMMISSIONER BOYD: It will take a minute, but --

MR. BEEBE: Bud Beebe with the Sacramento Municipal Utility District.

MR. WAGGONER: Ken Waggoner here for AID.

UNIDENTIFIED SPEAKER: Ben (inaudible), ECDO (inaudible). We provide enabling technologies in photovoltaics of soft metal (inaudible) storage, metal hydride batteries, et cetera.

MR. LAZARUS: Michael Lazarus, Tellus Institute.

MS. BEALE: Kathy Beale, USEPA, Region IX, Climate Protection --

MR. STEINBERGER: Joe Steinberger, Bay Area Air Quality Management District.

MS. PASCERO: Michelle Pascero, the Pacific Morris Trust.

MR. BLUMBERG: Louis Blumberg, the Nature Conservancy.

MS. TURNBULL: Jane Turnbull, the League of Women Voters of California.

MR. WOOLEY: David Wooley, Energy Foundation.

MR. SCHNEIDER: Marcus Schneider, Energy Foundation.

MR. WICKIZER: Doug Wickizer, Department of Forestry and Fire Protection, Chief Environmental Protection Regulations.

MR. DENNISTON: Eric Denniston, currently independent consultant. Recently worked with PG&E on their inaugural procurement of renewable power.

DR. WAGGER: My name is David Wagger. I am with the Center for Clean Air Policy in Washington, D.C.

MR. GANGES: (inaudible) Ganges, Director of Industrial Assessment Center at San Francisco State University.

UNIDENTIFIED SPEAKER: Sharim (inaudible), British Consulate General.

MR. WESTFALLEN: Bob Westfallen, Scientist with the Forest Service.

MS. MALAR: Connie Malar, Research Scientist with the U.S. Forest Service.

MR. CANTON: Tom Canton, Institute for Energy Resources.

MR. ADLER: Dan Adler, Strategic Planning CPUC.

MR. SMITH: Don Smith, Office of Ratepayer Advocates.

MS. STECKEL: Hi, I'm Molly Steckel. I'm with ICF Consulting.

MR. DU VAIR: I'm Pierre du Vair with the California Energy Commission.

MS. WHITE: Lorraine White with the California Energy Commission.

MS. DAVIS: Stacey Davis with the Center for Clean Air Policy.

MS. TUTT: Eileen Tutt with the Cal-EPA.

MS. HOUCK: Darcie Houck, California Energy Commission.

MS. CORFY: Karen Corfy, (inaudible) Energy.

MR. SANDLER: Mike Sandler with (inaudible) Clean Water Institute and the Climate

Protection Campaign.

MS. HANCOCK: Ann Hancock, Climate Protection Campaign.

MR. BURNETT: I'm Mike Burnett with The Climate Trust.

UNIDENTIFIED SPEAKER: (inaudible) with Redefined Progress. We work with several states around the country providing them with economic models for a variety of carbon policies.

MR. SMITH: Mike Smith with the California Energy Commission.

MR. SAN MARTIN: Greg San Martin, PG&E.

UNIDENTIFIED SPEAKER: Lars (inaudible), Center for Resource Solutions.

MS. DOWERS: Danielle Dowers, City of San Francisco Public Utilities Commission.

MR. LEVIN: Howard Levin, San Diego Gas and Electric and Southern California Gas.

MR. KLOBERDANZ: Joe Kloberdanz, San Diego Gas and Electric and Southern California Gas Company.

MR. BACON: John Bacon, Energy Consultant.

MR. BRUMHEAD: Cal Brumhead, City and County of San Francisco, Department of

Environment.

MR. HELME: Ned Helme, Center for Clean Air Policy.

MR. MESSENGER: And I'm Mike Mastrandrea from Stanford University.

MR. OLSON: I'm Tim Olson with the California Energy Commission.

COMMISSIONER BOYD: Thank you. We might ask if anybody on the phone wants to identify themselves.

MR. BENDER: Yes, can you hear me?

COMMISSIONER BOYD: Yes.

MR. BENDER: I'm Charlie Bender from University of California Irvine calling in from Colorado. Really would like to be there.

COMMISSIONER BOYD: I think we wish we could be there.

(Laughter.)

MR. BENDER: The snow is great, but it's melting too fast.

COMMISSIONER BOYD: All right. Anyone else --

UNIDENTIFIED SPEAKER: (inaudible) with the Alliance of Automobile Manufacturers.

MS. GRAY: Gina Gray, Western States

Petroleum Association.

UNIDENTIFIED SPEAKER: (inaudible) California on Safe Generation.

MR. GRANDING: Doug Granding with the Department of General Services. And I'm presently on loan to Dr. Lloyd, the hydrogen highway, and stationary fuel cell collaborative work.

COMMISSIONER BOYD: Okay, I think we've got everybody. Thank you. It was interesting to hear the cross-section of folks we have here. Thank you for reminding me, Peggy.

Now, Susan.

MS. BROWN: Okay, thank you. I'm Susan Brown; I'm a Senior Policy Analyst with the California Energy Commission. And welcome once again. I especially want to express my thanks to Mike Lazarus from the Tellus Institute, who came down from Seattle this morning to be with us. And to Ned Helme and his staff who have been working hard over the weekend to present some preliminary analytical results this afternoon.

But first I have a very short presentation, and really what I want to do today is just set out the agenda for the meeting and say a few words about what's been happening in the state government.

We have asked Ralph Cavanagh to speak on the recently released National Commission on Energy report, a bipartisan effort, which does include some very wide-reaching recommendations on climate change that I think will be of interest to all of you.

I want to say a few words about the West Coast Governors Global Warming Initiative. I served as the State Coordinator for California, along with representatives from the Governors' Offices of Washington and Oregon. And we did release our final report in November of this year, so we're going to be presenting some of the results from that activity.

And then Ned and his staff has an extensive presentation starting later this morning and into the afternoon on a series of policy measures that they're analyzing on behalf of this group.

I want to talk a little bit about the subcommittees that we formed. We actually formed them through some conference calls we had in November. And we didn't really agree on how to organize them completely, but I think that what we've tried to do is put some structure on the work of this Committee so that when Ned and his staff have preliminary results to present, they can run them by you and get, you know, one-on-one and conference call group feedback on some of the analytical results.

So, really, that's the purpose of the subcommittees. And I'll talk a little bit about that. And then we're going to hold off talking about schedule and next step until later this afternoon.

But first I want to assure you that the importance of climate change is being reflected in the activities of state government. In fact, since we last met there have been a number of important developments that I want to take a few minutes to comment on today.

The first was the one that Commissioner Boyd mentioned, and that is that the 2005 Integrated Energy Policy Report has been initiated by the Energy Commission. And climate change is one of several issues of importance to us.

This proceeding will extend through this year and actually conclude in a final report in the fall of 2005. And so we're very anxious to kind of hook in with this process and get recommendations from you on what the Energy Commission should report to the Governor and the Legislature on global warming and climate change.

Second, I think it's important to note that the PUC, the California Public Utilities Commission, has issued a series of important rulings stressing the need to incorporate climate change, climate change risk and climate change considerations in utility procurement.

And I think -- oh, Lanie, that was excellent timing. I have asked Lanie Motamedi, at the close of my presentation, to comment briefly on some of the activities in the PUC. And I want to put a plug in for the en banc hearing that the PUC is planning to hold in February, it's actually February 23rd, on climate change. And I think the subject of that is beyond procurement. So I'm going to call on Lanie and have her report on that.

On the motor vehicle front, the Air Board's proposed rules are undergoing legislative review. They are being seriously considered by several other states for adoption in other parts of the country. And at the same time, the proposed rules are the subject of a court challenge.

And if you have any questions on that Eileen Tutt is here representing Cal-EPA and the Air Board, and she can answer those questions if you have them. But this is a very important initiative for California on climate change.

Right before Christmas there was a joint statement issued by both the State Controller and PERS, the Public Employee Retirement System Board, using their pension-funded authority to ask the auto companies to comply with the Air Board's proposed rules. So that was an important policy statement that came out of the fiscal side of state government.

And lastly, there has been interest expressed by several state agencies to continue to include climate change as part of their policy and planning processes. And I know very recently Commissioner Boyd has had discussions with the new Secretary for Agriculture, and he is also very very interested in this topic and plans to do some work with us.

I'm pleased to report that in November the Governors of California, Oregon and Washington accepted recommendations from their respective staffs on ways to address climate change in both the regional and at the state level.

There were over 35 separate recommendations on a wide range of topics ranging from fleets to reporting protocols to a number of things having to do with efficiency standards and renewable portfolio standards. And the states have again pledged to work together during 2005 on some key issue areas.

We also plan to hold a regional conference later this year and there will be information on that available probably by our next meeting. And that would be the first ever regional conference on climate change on the west coast.

Some of the key issues that came out of this effort were the desire to coordinate with state level stakeholder processes such as this one. In fact, the Washington process has just concluded with a report that was posted on the website of the Puget Sound Clean Energy Agency only about a week ago. And the Oregon process is nearing close. So this is one instance where we're a little bit behind our friends to the north in terms of our stakeholder process on climate change. But we're hoping to catch up sometime this year.

The most important recommendations that came out was a desire by the states to adopt comprehensive state and regional goals for greenhouse gases. And that's something that's on the agenda for this upcoming year. And certainly this Committee can have input on that effort.

Oregon and Washington have pledged to adopt standards for motor vehicles similar to California's Pavley regulations. There's a desire to develop jointly a regional market-based carbon allowance program. We're not sure what that means yet. The discussions have just started. But certainly the work that Ned Helme and his staff are doing will inform that discussion.

And again, expanding the markets for efficiency, renewable resources and alternative fuels become part of the agenda for the west coast region.

And, again, Mike Lazarus, who follows me, will be going into a little bit more detail on some of the analysis that led to some of these recommendations.

In terms of the subcommittees, we formed subcommittees which were to be aligned along the end use sectors. For example, we have a subcommittee on power which has held a couple of conference calls to inform some of the power sector modeling that we've initiated.

And by the way, there are several agencies, including the PUC, that have expressed interest in that power sector modeling, because we believe that it will provide a baseline against which to evaluate a number of policies.

We had a transportation sector call and the consultant CCAP staff have been talking to individual members to get feedback on the priority issues for further analysis.

And we've had a committee formed, sort of the ag/industrial/forestry committee, mainly because of the number of committee members we have with that background. And that one has yet to hold a conference call, but I think following this meeting we're going to hear from Ned and his staff about some of the work underway and seeking individual input and probably hold a conference call or two in the near future.

We also discussed having a committee of

the whole on cross-cutting or economy-wide issues ranging from cap-and-trade, the carbon allowance system that is being contemplated in Oregon might be a subject for discussion by this entire group. Public education is something I know, Abby, you were interested in, and Mike Meacham has expressed interest in at least keeping on the agenda. And it may well be an issue for local government, but certainly something we ought to consider.

And market incentives to provide funding or other options for increasing the use of low carbon fuels. And I put some dates here because we have actually done quite a bit of work since our last meeting.

One of the important things we've done is we've shored up the support of the Center for Clean Air Policy and Tellus and the Energy Foundation to continue the work of this committee. Because without a solid analytical foundation we think that our recommendations will be subject to much debate and discussion. We want to have a strong footing on which to make recommendations this year.

So we also will be seeking additional input on power sector modeling assumptions. We're attempting to align the assumptions that the Energy Commission uses in its Integrated Energy Policy Report, which then wraps back into the work of the PUC and the Independent System Operator, since the three agencies have vowed to work very closely together on issues of concern to California.

And lastly, Ned will be presenting his schedule and talking more about the planned work that CCAP will be doing for the Committee, and some of the products will be available prior to our next two quarterly meetings. So we'll be talking about that, and how the schedule of the analytical work will affect our ultimate recommendations.

These were the subcommittee assignments that we arrived at. And they're still open for discussion, but I'm just going to put these up. We've not asked the subcommittee chairs to provide a report at this meeting, but my expectation is by the next meeting we'll have given you enough fodder for some insightful recommendations that we will be expecting to call on you in advance and have you give a subcommittee report. So, it's our attempt to kind of keep this moving.

So I'm going to stop there and we'll save the discussion of next steps till the end of the meeting. But I would like to ask, Lanie, if it's okay, if this is a good time for you to come up and maybe say a few words about the PUC's efforts on climate change.

MS. MOTAMEDI: Can you hear me okay? All right. I'm Lanie Motamedi; I'm an analyst in the division of strategic planning at the CPUC. And the two main areas that Susan asked me to comment on are a decision that came out in our procurement proceeding which essentially adopted a carbon adder range. So when the utilities take a look at their procurement decisions and evaluate the different types of resources, this is one way to bring renewables into an economically competitive arena.

And this is just for consideration when the utilities are evaluating their options. And I do want to mention this is something that PG&E was already doing, and we've asked the other utilities to move in the same direction.

And further, as part of the procurement proceeding on March 7th, 8th and 9th, at the CPUC here in San Francisco at 505 Van Ness, we're going to be having workshops to also start thinking about a cap for emissions as it relates to the regulated electric utilities. And Dan Adler will be running those workshops; and was also very involved in the procurement decision that I just mentioned.

The second item that Susan asked me to comment on was -- is the climate change en banc meeting which will be happening also at the CPUC here in San Francisco on February 23rd. And that is an all-day meeting with all of the regulated utilities, so that includes the energy sector, -- water, as well as some transportation companies, to look at the climate change impacts on California, and how that relates to our regulated utilities.

And then most importantly, to look at the best business practices. What are the benefits that business leaders who have already been dealing with climate change are beginning to reap by taking action. Both from a bottomline standpoint, as well as from a public perspective standpoint.

So we'll be hearing from business leaders, the financial and investment communities.

And we have a number of state agencies that will be participating. Commissioner Boyd will be there from the CEC, as well as CEC Staff. And we expect that the EPA, CARB and also the State Controller's Office will participate. So we can coordinate across state agency efforts.

The main goal of this meeting -- good timing, I will roll it out now -- the main goal is to get to a point where we can start developing recommendations both for the utilities to start addressing climate change broadly across their business and operational practices; as well as to hear from the utilities as far as policies that the CPUC should set in place to facilitate those efforts.

So that's the two updates in a nutshell. And I'll be here, as well as Dan will be, if folks have questions.

And I'm not sure who I'm introducing next. Thank you.

COMMISSIONER BOYD: Next we're going to hear from Ralph Cavanagh. Ralph, you got to get wired.

MR. CAVANAGH: No, I don't.

COMMISSIONER BOYD: Well, that's true --

MR. CAVANAGH: Don't be ridiculous. I have spoken to this room many times; I've never been wired I assure the court reporter --

(Laughter.)

COMMISSIONER BOYD: My apologies, Ralph.

(Parties speaking simultaneously.)

MR. CAVANAGH: What I'm sending around now is a two-page summary of the recommendations of the National Commission on Energy Policy on Climate Issues. And I'm going to summarize them for you briefly. I'll get us back on schedule because I can talk faster than anyone else on the program today.

(Laughter.)

MR. CAVANAGH: If any of you, for some reason, don't get a copy of the summary and want to get into the Commission's recommendations in more detail, energycommission.org has literally everything the Commission has produced.

As is already clear from what you've heard so far this morning, the last couple of months since we last met have been a time of extraordinary progress on these issues.

I would like to personally note my appreciation to Lanie and her colleagues at the

PUC for the remarkable precedent that they have just set; to Susan and to Bob and to everyone at the Energy Commission, the work of the West Coast Governors Initiative on Global Warming, which you'll be hearing more about in a moment.

These, I think, in terms of their immediate implications for us are the most important things you'll hear about this morning.

I am grateful for a chance to summarize the work of the National Commission, though, because from time to time I hope this group will connect itself to the conversation that's going on in Washington, D.C. about what to do at a national level. And the Commission report is intended to be part of that conversation. Obviously only a part.

I have also told some of you as I came into the room as you began to question me about some of the details, I am emphatically not presenting, at the moment, a utopian proposal for resolving climate dilemmas for the United States. I am presenting the results of what I think is an interesting political compromise, one of several that we'll be hearing about in the months immediately ahead.

And in making that case to you I should explain a little bit more about what the National Commission is, and what it was charged with doing.

It was established principally by the William and Flora Hewlett Foundation, headquarters gratifyingly close to us here. And its mission was to bring together a group of, started out at 18, ended up as 16, convincingly bipartisan participants in the national debate on energy policy. It was not a climate body in primary focus. It was supposed to look at a comprehensive energy bill.

And it was supposed to do that, again, in a compromised and negotiated fashion. It was intended to bring together people like Archie Dunhan, the Chair of Conoco Phillips; John Rowe, the former Chair of the Edison Electric Institute; Marty Zimmerman, the voice of the Ford Motor Company to the Congress in recent years.

In addition to people like me and people who are more connected to, in partisan terms, the democratic side of the energy policy debate. I, of course, hold myself above all such considerations.

(Laughter.)

MR. CAVANAGH: The result of this was a report that was released on December the 8th. That report undertakes to outline a comprehensive energy bill with a climate section. I should emphasize that it has a number of other sections.

Ben will be extremely interested, I'm sure, in the section on oil dependence and vehicle fuel economy. Those in this room with an interest in energy efficiency, renewable energy will find substantial chapters on those issues.

A very significant attention to electric sector restructuring, as Jan knows, and she was an important contributor to that effort.

And in general, the attempt to put a comprehensive package forward of which climate is only one part, and to do so in the context of a package that everyone in that very diverse group could support.

So that is, I think, essential background in terms of understanding the limitations on any climate proposal you could expect from such a group, several of whose members represented trade associations which going in had taken a position that no national action on climate change was appropriate at the current time.

The proposal that emerged on December the 8th does have a climate section. It does recommend that the Congress enact a national system of limits on greenhouse gas emissions. It does so in the context of a cap and trade system, very familiar to the conversations around this table.

In the proposal the cap locks in and becomes effective in the year 2010. It is designed to integrate elements of both the current legislative proposals that are on the table and the administration proposal that is on the table.

It does that by taking -- it's basically used designing the cap on greenhouse gas emissions based on an estimate of the greenhouse gas intensity of the economy as a whole. And the cap is framed in terms of reducing the carbon intensity of the economy in much the same way that the Administration has proposed. Except that unlike what the Administration has so far proposed, the steady reductions in carbon intensity are framed as an annual cap on total emissions.

That annual cap on total emissions results in a certain number of emissions allowances which are allocated, most of them, to entities that are already emitting greenhouse gases.

Starting out at the beginning of the proposal the notion is to have 5 percent of all the emissions available for auction to sources of new emissions and to support various other forms of activity and to raise revenue that would then be used to generate more research and development on clean energy technology.

And over the period of the proposal the fraction of the allowances that is auctioned goes up from about 5 percent to 10 percent. The cap goes in in 2010. The cap is ratcheted down further in ten years out, in the sense that over the first ten years that the cap is effective you would basically have a cap that allowed emissions to grow very slowly throughout the U.S. economy.

In the second phase the emissions would be frozen. And in the third phase the emissions would start to decline.

There is a check-in period in 2015 which is designed to have the Congress take stock of whether other nations in the world are making comparable efforts before going further.

And finally, there is a proposal for a so-called safety valve, which is designed to make sure that the cost of emissions allowances does not rise above a certain level which is proposed to be $7 a ton of carbon dioxide in 2010. And that safety valve level ratchets up every year at 5 percent, which is intended to be slightly ahead of inflation.

The effort here is to create cost certainty about compliance with the overall effort to limit emissions. And the proposal concludes with estimates of exactly what the maximum impact on the system would be if this safety valve were in place.

And for those who are concerned about the cost of the greenhouse gas limitation program, I suspect that those estimates will be gratifyingly reassuring.

It is obviously not, in terms of the total trajectory of the U.S. emissions compared to other proposals on the table, a tremendously ambitious effort. I emphasize again, in the first decade that this proposal would be in effect, starting in 2010, the cap would actually allow emissions to continue to rise slowly. In the second decade they would stabilize; and they would decline thereafter.

The effort here within the context, constraints and limitations of this group is to try to find a way forward on climate that allows climate emissions to begin to factor in economic decisionmaking in exactly the way that Lanie described, that the PUC aspires for California utilities.

Obviously the effort here is to have that happen at a national level. And also to send a signal that the value of reducing greenhouse gas emissions will go up steadily over time, while still allowing for reasonable cost certainty and a framework that's long enough so that entities involved in complying, in making investment decisions, have a reasonable chance to turn their capital stock over before making very large investments.

All of this with an eye toward the members of the Commission hope of giving the Congress a sense that there might be a way forward out of what is now widely perceived as a deadlock on climate emissions and climate regulation.

Now, I think what I want to emphasize in closing, and I'd be happy to answer any questions about the Commission's proposal, I do hope you'll all take a look at it on energycommission.org. If any of you want a physical copy of the report all you have to do is give me a card at any point during the meeting today and I will get one sent to you.

I should emphasize in closing, again, see this for what it's worth. It's a product of 16 individuals. They were not there representing their organizations. They were there in their own right. They stand together behind the package as a package. They would say, I will say, that it is not my utopian ideal. I would not support every detail of it were it not part of a package, but I am prepared to go to the Congress and say this is better than anything else that's on the table at the moment.

Don't assume that any of the groups associated with the authors of the report from the Ford Motor Company, to the Edison Electric Institute, to NRDC, necessarily support the report or its recommendations.

And for us, again, what I hope this will serve as is one in a series of ongoing connections to the national debate, which is obviously important for us to be aware of as we think about what California should do. But is in no sense intended to preempt the tough decisions that we have to make as so well exemplified by the early reports by Lanie and Susan.

We're got a couple of minutes. I think, Susan, I'd be happy to take any clarifying questions folks have on the report. Yeah.

MR. BEEBE: Yeah, it's an interesting proposal, as you mentioned. And one of the most interesting things about it is that it begins to -- this is Bud Beebe with SMUD -- it begins to derive an interesting new couple between GDP and carbon, and then to try to couple that then with this intensity factor.

A difficult thing, I would think, to begin with. And obviously they chose a safety valve mechanism so that you would not pull GDP down just because you're trying to restrain carbon and save the world.

On the other hand, you did not build in any other mechanism where you could get a greater decrease in intensity reductions, similar to the safety valve that lets you go up forever, if you wish. And to go down some more, based on feedback from the most promising economic greenhouse gas reduction methodologies.

So that's just a difficulty I see with it, along with the second one, which is while it begins to reduce the intensity of greenhouse gas growth, it takes a whole second will of the people, if you will, to get it to the point where it actually would tip over and turn down.

MR. CAVANAGH: Yeah.

MR. BEEBE: So that's a problem.

MR. CAVANAGH: Fair comment.

MS. PULLING: This is Wendy Pulling with PG&E. Ralph, what do you see as likely or possible next steps either for the National Commission, and does it still exist? Has it disbanded? Is its work done? Will there be any potential legislative moves, et cetera?

MR. CAVANAGH: It still exists. It will be in place at least for the next year. It will be attempting to assist the Congress in actually, as the title of the report implies, breaking the deadlock and doing something. Again, not just on climate, but on national energy policy. And the members of the Commission are pledged to try and do that.

I think that the -- the other comment I would make, Wendy, is that I think in terms of the predictive value of this, it is for those who would like to see, for those who believe that ultimately the market-based cap and trade is the right way forward, it's heartening to see a bipartisan proposal like this emerge from a group that could so easily have deadlocked on that issue.

And I think, for that reason, what I expect this to do, frankly, is to add to momentum that is already building. Much of it within the industry trade associations, themselves, can do something constructive on climate. And to break away from the kind of just-say-no position that has paralyzed progress so far.

Once you get out of the stalemate then my own view is that much more is possible, and that I hope a lot more creativity, of which this is only one illustration, will come forward and begin to engage around the question of what we should do.

Yeah.

DR. SCHNEIDER: Thank you. Steve

Schneider. I agree completely and have long argued that we worry too much about numbers in the short run and not enough about process, because we have to transfer ourselves over to a cooperative mode of thinking for which these are important.

But as long as we admit that we're really in an experiment, and perhaps a half-a-generation-long experiment to learn how to do this, it matters how you do it.

And I'm wondering, you talked about a cost cap, you know, the RFF proposal to try to limit things. Or even talking about any of the benefits. There are significant serious measurement problems. People do supply curves which have single dollar values for each thing when we know full well they're really probablistic ways of thinking.

So, how have you grappled, or are you yet not there, with who calculates the cost, who certifies emissions, what are the protocols we use and how do we try to incorporate the fair degree of uncertainty? Because, again, I'm not so worried about what the final number is, but I think since we're in process experimentation it's probably important to try to get those things upfront so we can get long-term agreement on better protocols over time.

MR. CAVANAGH: And, Steve, I'm going to try to respond. First of all, every comment I get, both these and any others you guys give me outside, I'm not going to try to rebut them, I'm going to take them back and try to use them.

On this one the assumption underlying the report is clearly there will be a national market in carbon. It will be comparable to the sulfur market. You'll be able to track, therefore, prices on the market. You'll be able to track market clearing prices.

And if you hit the cost threshold, the notion is that instead of letting the trading continue, the government simply begins issuing more allowances at the threshold price, $7 a ton going in, ratcheting up over time.

So, I don't know -- I mean I suppose the monitoring is the same as we now use, at least conceptually, with sulfur markets. You got to be willing to assume that those markets will clear at a known price, and that the government can step in and sell extra allowances to prevent the price from going above the safety valve level.

Many of you will recall that when the sulfur regime was put in place there was a similar safety valve which has never been reached, or even close to reached. So the issue has been academic.

DR. SCHNEIDER: This will include world market prices?

MR. CAVANAGH: No. The proposal here is to have the safety valve apply to the market clearing price for greenhouse gas emissions on the U.S. markets. And the question of that connects to the international markets is not well addressed in the reports, yeah.

Yeah?

MR. PARKHURST: I'm a little confused on the intensity measurement.

MR. CAVANAGH: Sure.

MR. PARKHURST: Robert Parkhurst with HP and the Silicon Valley Manufacturing Group.

I'm a little confused with the intensity measurement, if it's CO2 per GDP --

MR. CAVANAGH: CO2 equivalent per --

MR. PARKHURST: CO2 equivalent per GDP. Hasn't that been going down?

MR. CAVANAGH: Yes.

MR. PARKHURST: I have something here

from EIA that it's 20 percent down between '90 and 2002.

MR. CAVANAGH: There is no question it has been doing down. The proposal is to accelerate the rate of reduction, Robert, but you're --

MR. PARKHURST: Okay.

MR. CAVANAGH: -- absolutely right. And the numbers you'll see in the two-page summary, the comparison between the expected reductions and the business-as-usual reductions.

MR. PARKHURST: Okay, because on the other side of this it looks like it's just CO2 equivalence, which is -- that's what was throwing me. Thank you.

MR. CAVANAGH: Yeah, thanks. Yes, Steve.

DR. SCHNEIDER: One more, I can shout -- I missed the first time that you were using CO2 equivalence, so that brings us into the basket -- thank you -- using CO2 equivalence --

MR. CAVANAGH: Yes.

DR. SCHNEIDER: -- okay, the basket of gases approach question. Has anybody looked at that, or using GWP as one of the time horizons, how are you going to deal again with the supply curves, with methane versus other things? I'm surprised you even went there because that is such a controversial issue where measurement is so difficult. Why not just stay with CO_2?

MR. CAVANAGH: I think that point is well taken, and I'm not going to try to defend. My own view is that in the end, Steve, that's probably what will happen for the reasons you just --

DR. SCHNEIDER: Everybody will use it as an escape valve or not, by pointing out other costs which are really not well established on the other gases. Or black soot. I mean this kind of stuff. It's just a can of worms.

MR. CAVANAGH: Thank you.

(Laughter.)

MR. BEEBE: Just a comment, too. I know that the Commission was trying to put its best foot forward in showing the positive aspects of this thing, but in the table that goes along with this particular chapter you have to read down pretty deeply into the footnotes to find out that what they call a reduction in that first year, I think it's like 500,000 tons or something, is actually an intensity reduction of some sort.

MR. CAVANAGH: Oh, okay, although I think what --

MR. BEEBE: Just to say that the tone of it should be taken by people who read it, they need to read it as an interesting proposal, but you have to read deeply and look clearly at the processes to figure out some of the numbers.

I also say that when I read it I was giving great latitude to the integrity of the people who calculated those difficult changes in intensity and what it does to the absolute values. It's not clear to me that when I look at the EIA carbon dioxide values from 1990 and 2000 that I come up with the same, you know, basic overall set of numbers.

So, as Stephen said, the process is really very important.

MR. CAVANAGH: Sure. Happily we have this room accessed to the California Energy Commission, the definitive voice on these issues --

(Laughter.)

MR. CAVANAGH: The Commission, of course, did not have that advantage.

I should probably turn the floor back to the Chair. Let me just close with this personal observation. The room in which you now stand, I said when it was christened, was the premiere energy efficiency demonstration facility in North America.

I told Wendy at the beginning, and then I realized that there were sitting in this room, representatives of SMUD, Sempra and Southern California Edison, in whose facilities I had made identical claims --

(Laughter.)

MR. CAVANAGH: -- when those facilities were christened. So let me simply say, we are privileged to live in a state that has four --

(Laughter.)

MR. CAVANAGH: -- of which this is one. And I hope at some point we end up meeting in all of them. Thank you.

COMMISSIONER BOYD: Thank you, Ralph.

(Applause.)

COMMISSIONER BOYD: Well stated and representative of the report which, frankly, as an old veteran of politics with a small "p", I was very impressed with the report in light of the environment in which we operate, and with the folks you worked with.

So I think it's fairly significant and something this group should not set aside. Who knows, maybe we will have a role in commenting on that report.

MR. CAVANAGH: You already have, --

COMMISSIONER BOYD: And in helping --

MR. CAVANAGH: -- with my thanks.

COMMISSIONER BOYD: -- in the national effort. It's good to have you here therefore to do that. Susan.

MS. BROWN: I think at this point I'm going to call on Michael Lazarus, who is here from the Tellus Institute, to share with us the regional analysis done on behalf of the States of California, Oregon and Washington, as part of the West Coast Governors Global Warming Initiative.

So, Mike, with that I'd like to have you come up and I'll turn it over to you.

MR. LAZARUS: Thank you, Susan. I don't know if I need to be tethered. Can everybody hear me just fine? I think I might be able to talk as loud, and maybe even as fast as Ralph, but lacking the same erudite and articulate quality. So, Ralph is always a tough guy to follow. So, if everything's fine I'll leave this aside.

(Pause.)

MR. LAZARUS: For those of you who took the slides in the back, I did send them out ahead of time. But I've shuffled a few of them just to mess you up in case you're going to plan to read the slides instead of watch the presentation.

And my apologies to folks on the phone. So you know there's a few things out of order, I added a slide, so I'll let you know when that is.

All right, so, I'm going to talk a little bit about it, as Susan pointed out. And I want to thank Susan for all the input she's provided and her team at the California Energy Commission, as well as Commissioner Boyd, for allowing us the opportunity to talk about this here.

I'm going to talk a little bit about the greenhouse gas emissions scenarios for the west coast region that we've prepared. In case you're not familiar with Tellus Institute, we're based in Boston. And we're a group of about two dozen researchers. We've been doing work on energy, climate change, business in the environment, sustainable communities and a whole set of other programs for nearly 30 years now.

I managed to escape back to the west coast. I'm actually a native Californian, so it's really gratifying to be here and see this take place after being involved in stakeholder processes in Rhode Island, Puget Sound where I lived, elsewhere and internationally. It's great to see this, so thank you all for being here and contributing to making California once again the leader in so many things, a leader in climate change.

And we're also linked with the Stockholm Environment Institute; Tellus Institute acts as the Boston center. So we have sort of an international linkage to research institutions in England, Sweden, the Baltic States and elsewhere. An organization that's not so active now internationally in the climate change scene, but was very active early on when the IPCC was being formed in organizing the AGGG group that led into the IPCC.

All right, so I'm going to talk to you about the report that we did as an input to the West Coast Governors Initiative called "Turning the Corner on Global Warming Initiatives." It was analysis of the three west coast states that we did about six months ago.

I'm going to talk a little bit about the objectives and methods; the strategies we considered; the key findings. And then I'm going to segue a little bit because since that time we've done some initial work, sort of as a bridge to the work that Ned Helme and his team, Center for Clean Air Policy, are doing for this group, to try to refine somewhat the estimates of greenhouse gas emissions for the State of California.

We did some projections for this analysis. We looked at some more recent information in more detail. And I'll lay out a little bit of that as sort of a lead-in to what Ned and his team are going to talk about.

So, this is a slide I happened to add because I realized there's really nothing connecting the concept of sort of why turn the corner on global warming initiatives with the specific strategies we're going to talk about. So I just took one set of slides from the IPCC's third assessment report that speaks to this question, and it sounds from the tenor of the room, it's a very sophisticated crowd here; moreso than I've run into in other stakeholder groups, so I hardly necessarily need to mention some of these issues.

But one of the key questions is why turn the corner; how soon do we have to turn the corner on emissions; and start them on a downward trajectory.

And these charts show the bands of emissions trajectories out two to three centuries if we are to achieve the concentrations of 1000 parts per million CO_2, all the way down to 450 upper bounds, lower bounds. And internationally there's a growing discussion about thinking in terms of a 2 degree Centigrade threshold for sort of passing the level of dangerous interference with the climate system.

I won't go into a series of those. I know Stephen Schneider and others can talk in a lot more depth about these issues.

But the point being that if we are to think about trying to avoid that, we need to start turning the corner now. If we're trying to reach 450 or even 550, as some people are talking about, you see a need to turn the corner fairly soon.

And there is a considerable amount of uncertainty. And there is, of course, discussion about who should go first, developing countries, developed countries. Clearly if developing countries need some space to grow a little bit, then thus the onus on us to turn the corner fairly quickly.

This study, itself, was prepared as input to the West Coast Governors discussion, to contribute to discussions about achievable reductions. Up to the point, I think, where we provided this input there were a lot of discussions about the types of strategies the states were already doing. And some of the thinking going into where the three states could go.

The idea was to put together a sort of straightforward and relatively initial framing of a few strategies, ten strategies to be specific, to look a little bit into the cost implications and to begin preparing for longer term reductions.

So, not a comprehensive study; not a detailed -- well, it will look fairly detailed, but not as comprehensive as, say, Ned and his team are going into right here for you folks, for

California. And to complement the existing work that was being done in the states.

I couldn't resist throwing this slide in, because I found it in the EIA slides. So if you're really into nice graphics you can look at it in your charts. The point being is that, you know, California is three-quarters of this picture in terms of greenhouse gas emissions and energy use. Washington and Oregon share some similar features to California, as you're well aware.

Clearly more rainfall most years in Washington. Unfortunately , we can't go skiing in Washington this year because you got all the snow. So there is a little bit of a diversity benefit, too. Because when it rains in one place and it doesn't in the other, usually things balance out.

So, where is the region in terms of greenhouse gas emissions? Where do the emissions come from? It's a story that you've probably seen already. I think, Susan, you probably presented slides similar to that.

As you're well aware, transportation is half of the issue in the west coast, whereas it's about a third in the rest of the country. Because much of the rest of the country has so much in terms of industrial and coal-based electricity emissions that are absent here.

And energy makes up about 93 percent of the mix here. Energy-related CO2 emissions. The 7 percent slice represents what nonenergy, nonCO2 emission are today. That's a growing slice, however. And what you're seeing there, however, is -- I see some quizzical looks -- is that that slice includes, in fact, 15 percent if you include all of the other emissions, at least in the basket of six gases that are typically discussed, carbon dioxide, methane, nitrous oxide and the fluorinated gases.

But there's also net sink from agriculture and forestry that shrinks it back down to 7 percent. Okay. So there's a lot more going on in that slice than meets the eye.

And the region, the west coast, is about one-fortieth, or 2.4 percent of global greenhouse gas emissions. And about 9 percent of U.S. emissions. And California is about two-thirds of that. Yes?

MS. DUXBURY: Does the electricity number include electricity that's imported, --

MR. LAZARUS: Good question.

MS. DUXBURY: -- that is located outside of --

MR. LAZARUS: Yes, it does.

MS. DUXBURY: -- these three states?

MR. LAZARUS: And I'll get to that right in this next slide.

So that slide you just saw includes, is a larger slice, and you'll see in the California inventory, in the Washington inventory and in the Oregon inventories because we chose to include electricity emissions based on consumption. I believe you talked about that a little bit already, so, familiar topic.

For this analysis we wanted to keep it relatively simple. We focused on energy-related greenhouse gas emissions out to 2020. We relied, to the extent possible, on CEC studies and forecasts. Same thing for the Northwest Power Planning Council and the Oregonal stakeholder process.

And so we looked to each of the states to try to get the building block assumptions for projections. As well as for the analysis of many of these measures that we looked at.

We also iterated with staff --

MR. PARKHURST: The numbers that you've got on there for buildings and industry, those are primarily from manufacturing and from like scope 2 emission instead of scope 1? So it's --

MR. LAZARUS: You're talking --

MR. PARKHURST: Excuse me --

MR. LAZARUS: -- GHG protocol scopes?

MR. PARKHURST: -- so direct emissions. So when you're talking about buildings --

MR. LAZARUS: Yes, they're all direct -- exactly. They're all direct onsite use of fossil fuels.

MR. PARKHURST: Onsite use, thank you.

MR. LAZARUS: So we did relatively straightforward spreadsheet analysis for most options. We complemented that with some stock turnover modeling for the light duty vehicle analysis which I'll talk about in a moment.

We used the USDOE NEMS model for looking at electricity sector impacts. I believe Ned and Stacey and some others are going to talk a little bit more about some continuing work we're doing with the NEMS model for you folks in California.

And we tried to make sure, then, when looking at individual options, of course, this is very important, that you're not double-counting emissions reductions. You're not avoiding the same power plant emissions through renewable energy in an energy efficiency project. So we did that in an integrated fashion in the software we have called LEAP.

And we also looked very simply at some potential direct cost implications of these strategies. We did not look at comprehensive cost/benefit analysis, macroeconomic impacts, basic net present value engineering type calculations.

DR. SCHNEIDER: What discount rate?

MR. LAZARUS: Five percent.

DR. SCHNEIDER: Did you try sensitivity to that, or --

MR. LAZARUS: No, we didn't. But we're only looking out to 2020 in these measures, so it's a very -- it's not the long term that you're discussing.

DR. SCHNEIDER: -- 5 percent is way too high.

MR. LAZARUS: Right. And we looked at electricity emissions based on instate consumption. So we looked at statistics that are available from each state about what electricity imports look like, where they come from.

The basics on the basecase projections. And although we did not -- these economic projections that show a growth of about 70 to -- they're all indexed to the year 2000, and you see the economy, the top line growing in terms of gross state product by about 75 to 80 percent according to current projections.

The energy use projections that have been compiled consistent with those gets you increasing energy use by about 30 to 40 percent. And GHG emissions grow likewise.

So, we're already seeing that reduction in energy intensity play out here. Like, Robert, you were referring to, is already happening in the U.S. economy.

MR. HERTEL: Could you talk about your first bullet there? What exactly is the growth rate for California vis-a-vis Oregon and Washington?

MR. LAZARUS: Have to open the report. My guess is we're talking probably 2 to 3 percent GSP, but I'm going to have to go back and check. We did not do an integrated modeling analysis. We didn't try to project energy use in a model, ourselves, based on GSP. So we looked at the common GSP forecasts that were done, say, on a state level. And what energy use projections come from the states. We're assuming that they did that sort of connection in terms of what that means.

So my guess is we're talking -- do you know what kind of growth rates the CEC modeling studies typically --

MS. BROWN: It's probably 2 percent for GDP.

MR. LAZARUS: Right, okay.

MR. HERTEL: What I was really wondering was compared to Oregon and Washington.

MR. LAZARUS: Right. And it's higher a lot because of also population growth; it's expected to be more significant in California to look at some of the demographic projections.

But economic growth rates --

MR. HERTEL: Just roughly what are the --

MR. LAZARUS: -- are about half a percent more.

MR. HERTEL: -- roughly what are the

population differences between the states?

MR. LAZARUS: Six million in Washington; little bit less in Oregon. And what do you have, 30 million here -- 35 million.

So, the other thing we tried to do in our basecase analysis here is tried to include existing policies that are already in place. Okay, so bear that in mind.

The renewable portfolio standard that you already have in California, which already achieves a significant degree of emissions reductions, is already built into our basecase.

DR. SCHNEIDER: Just something I'm confused. I thought you said there was an intensity improvement, yet the energy use and GHG tracks. So, if you were getting carbon intensity improvements, shouldn't the stars start dropping below?

MR. LAZARUS: Okay, so there's two elements there, right. One is the intensity -- is the energy intensity of the economy is improving.

DR. SCHNEIDER: Right, right.

MR. LAZARUS: Decarbonization is not happening in the scenario, i.e., the carbon intensity is not necessarily improving. And this is in the basecase.

DR. SCHNEIDER: Okay.

MR. LAZARUS: Okay. Because there's a whole set of factors going on in the current basecase.

DR. SCHNEIDER: Unlike IBCC where they do improve carbon intensity in the basecase.

MR. LAZARUS: In the basecase. Well, this is implication -- the other thing you've got to realize, too, here on the west coast, especially in the electric sector is that unless you significantly expand renewables you've already got a base of hydroelectric resources, what's on the margin is coal and gas. And so it's sort of different from the rest of the country.

Okay, what are the ten strategies we looked at. Why these ten strategies are not the full list of things that I think you're going to examine here in this room. They're certainly not all that's possible. They may not be the best.

They were things that represented the broad range of emissions sources from energy across buildings, industry and transportation. They're also strategies that have been discussed at the state level, that the states have levers to pull to make these strategies happen. And they've been considered in some states, they're already well underway.

So we've built upon those -- stood on those shoulders; looked at codes and standards, and by that we mean basically efficiency building codes, appliance efficiency standards. And there we looked at largely here at a set of appliance improvement standards that already are on the table; that actually since the study were done, have been adopted in California or have been submitted in legislation in Washington; and I believe are underway in Oregon.

So, some of these things are already beginning to happen. And we didn't look at everything that's possible for codes and standards. We just looked at a snapshot of what's being discussed there.

In terms of efficiency programs we looked at the cost effective achievable gas and electric potential. Things like I heard there's somebody from Kemis (phonetic) Energy, the studies that you did for the utilities and energy foundation, the Northwest Power Planning Council's fifth power plan. Relatively well accepted estimates.

Again, in this case the PUC has already adopted -- since we did this report, adopted the energy savings goals here in California that may capture a lot of that potential. But at the time we did this, significant potential -- programs, of course, still need to be put into place.

Industrial carbon policy. There we looked at the kind of improvements and savings that are possible through voluntary actions, negotiated agreements. We're not specific in this analysis. This is not really a policy analysis, it's a strategy analysis, i.e., we did not look and say, okay, you proceed with a negotiated agreement, how much can you get for negotiated agreements. What level of cap and trade do you need. What are the costs and benefits of that.

We looked at the total potential savings in direct use of natural gas, oil and coal, what little there is, in industry, based on studies that are out there. This needs a lot of refining with state level work. I believe the C-cap team is already beginning to do that for you for this process.

We looked at existing studies about

what's out there; did not proffer what policy mechanism you might want to choose to get there.

Combined heat and power. Again, we didn't say what sort of barrier removal or incentive programs you would need for that. We just looked at the available potential that's out there indicated by various USDOE and other studies, okay.

So, we're still looking at this from, say, you know, 2000 or 5000 feet above the ground. You got to take it down to the ground when you're doing these stakeholder processes, how much combined heat and power potential is there really left. What are the barriers? Can you get there?

Renewable portfolio standards. In the case of California where you already have one and there's discussion about accelerating it, we modeled what's been put on the table, the accelerating it to a 33 percent renewable portfolio standard in California. While Oregon and Washington, who have yet to adopt a renewable portfolio standard, would go for something more modest like 20 percent.

And then we also looked in the electric sector carbon policy. And here we did some very preliminary initial runs of the NEMS model, which we have since exercised more specifically to the needs of this group, and we will continue to do so, to look at what would the emissions reductions be if -- now, this is important to keep in mind, you already implement all these other policies -- and then on top of that you also do a carbon policy, okay.

And, of course, you could get efficiency and renewables by applying a carbon policy, but it's a bit of a blunt instrument to get those kinds of savings that you can get through efficiency programs or renewables.

We looked at -- we modeled what would the level of reductions be after those policies if you had a system that achieved, that reached a trading price of $20 a ton CO_2. Significantly higher than what Ralph noted the National Commission sought as a safety valve cap, at least for starters. But not that terribly high in terms of what it necessarily means for prices.

MR. HERTEL: Did you model (inaudible) carbon policy?

MR. LAZARUS: No, we didn't. We looked only at the electric sector. It was, in part, just to keep it simple and straightforward for this analysis. I believe that Ned and Stacey and their team are going to be looking at trying to include industrial sources and larger point sources, as well, if I'm not mistaken.

Question?

MR. SAN MARTIN: I'm Greg San Martin with PG&E.

UNIDENTIFIED SPEAKER: Would you come to a microphone, please?

MR. SAN MARTIN: I'm Greg San Martin with PG&E, and I'd like to know if, like electricity, the Commission's associated with transport of goods and people in the state were included as if they were state emissions.

MR. LAZARUS: The what emissions associated with --

MR. SAN MARTIN: Transport, shipping, air traffic, interstate trucking --

MR. LAZARUS: Okay, so the question of international -- and international bunker fuels for transportation, there's air emissions for interstate and international travel.

We did not, as you can see from the list of transportation strategies, we did not too much get into the types of measures and the sectors that are really intense, shipping and air, in terms of interstate and global commerce.

So we sort of steered away from that; we looked at what was in the inventories. And since we didn't do anything, for instance, on jet fuel, that doesn't really come up and is not affected by our projections.

So, whatever's in the inventory, which I believe is a little bit of a mix, is what's reflected here. Sorry for the, you know, still vague answer on that question, but it's an important question you need to deal with.

So on transportation, let me be brief. We looked at four strategies here. And transportation, of course, is a little different from buildings and industry where you have a number of technologies on the shelf and programs ready to go that you can run with. A lot of the things that you're talking about require some technology transformation, infrastructure development and time for stock turnover to enable these emissions reductions to occur.

We looked at light duty vehicle GHG emission standards. You may be thinking Pavley.

Well, it is similar to Pavley. And at the time we did this we modeled it by taking what was then an improvement in grams per mile of 30 percent by 2014, which has since been changed, extended to 2016.

And we took it further. We said, okay, what if you kept going all the way to 2020, just to sort of frame what's possible. All the way to 50 percent reduction in grams per mile for new vehicles in 2020. So our results don't match up with what you find in Pavley; it goes a little bit farther.

With alterative vehicle fuels we looked at a mix of cellulosic ethanol, 10 percent blended gasoline; biodiesel, 20 percent blended diesel, which is challenging given available supplies of biodiesel. And we looked a little bit at hydrogen fuel cell vehicles.

In general, in the study, since we were looking at the shorter term we did not look at things like hydrogen and carbon sequestration in a lot of detail, which may be extremely important in terms of the long-term transition. We were looking at things that can turn the corner between now and 2020. So less emphasis on hydrogen.

Vehicle travel reduction through things like, you know, smart roads and pay-as-you-drive insurance; there's a whole host of things that I'm sure you'll be discussing. We didn't try to be specific. We took a 5 percent estimate. You can get that far through a set of initiatives.

And then we looked at basically trucks. Try to do something similar to Pavley type reductions for trucks. But it turns out that it's a little bit harder with trucks because trucks are on the road for 25 years, and it just takes a little bit longer.

DR. SCHNEIDER: You may have said it, reductions relative to the basecase, you showed this earlier, rather than to say an indexed year?

MR. LAZARUS: Yes, that's correct. So everything is reductions relative to basecase.

DR. SCHNEIDER: Okay.

MR. LAZARUS: Okay, so here are the results, so-called Jaws chart. And what you find when you put all of these things together, that if you're able to achieve all the reductions that studies would seem to indicate -- look at that -- you find that the three states, together, and sort of ignore the fact that we really didn't model in detail between here and 2010, so it's probably more like a curve that goes up and comes down -- you start inflecting the curve, or start to reduce, with all of these measures together, emissions across the three states after a fairly steady continued rise from 2000, begin to turn the corner in 2010. And head down and get back pretty close to 2000 levels by 2020.

And the big reductions that you're talking about, the top stack here, the top six are buildings and industry and electricity. They kick in a little bit earlier. The transportation emissions start to reduce more significantly in the long run. Takes time to get alternative fuels in the market. It takes time for the light duty vehicle stock to turn over.

These types of measures may not be as significant out in 2010, but by the time you get out later they become the most significant ones there are.

And, you know, folks at the beginning talked about the importance of efficiency. Well the first one's efficiency and the second one's efficiency. The third one is largely efficiency. You can consider combined heat and power efficiency. And if I won't get shot for saying so, you know, light duty vehicle emission standards are also have a significant component of efficiency in them, as well.

MR. CAVANAGH: Yeah, you'll get shot.

(Laughter.)

MS. PULLING: Careful, you'll get deposed; he won't get shot.

MR. CAVANAGH: Get sued, at least.

(Laughter.)

MR. LAZARUS: I don't work for any California state agencies.

All right.

MR. CAVANAGH: Michael.

MR. LAZARUS: Yes.

MR. CAVANAGH: How much above 1990 levels is the 2000 point, do you know offhand?

MR. LAZARUS: Yeah, in fact, I think on the next slide, if --

(Parties speaking simultaneously.)

MR. CAVANAGH: Right, I just want -- since many of the international treaties are calculated from 1990 levels, it's helpful -- what this chart is showing is that all of those measures, you modeled all of these measures combined to return you to 2000 levels by 2020 for the three states.

MR. HERTEL: Ralph, you really are thinking global 1990 levels.

MR. CAVANAGH: I just, yeah. Point well taken, Michael. I just want -- there obviously was some growth in emissions for the region before 2000. I just want to get some sense of what it was.

MR. LAZARUS: Yes, and I'm sorry that the chart -- I realized when I put this together I should have started out in 1990 for your visuals. It gets you back to about 6 percent above by 1990.

MR. CAVANAGH: For my colleagues, that's very asymmetrical. Washington and Oregon, I think, it's substantial growth. California barely moves. Right, Michael?

MR. LAZARUS: Well, you can see that. I'll go to the next slide, which is a little bit hard to read from, but if you look --

MR. CAVANAGH: No, I mean since 1990. 1990 to 2000, which is --

MR. LAZARUS: Yes.

MR. CAVANAGH: -- doesn't address, I believe there's a very asymmetrical rate of growth among --

MR. LAZARUS: Indeed, indeed. Because California sort of dipped from 1990 out to 1995 and started climbing back up for its 2000, whereas there was more continuous growth in Oregon and Washington.

However, overall, because California's a bit stronger growing economy in terms of emissions, it's a little bit harder to turn the curve in California than it is in Oregon and Washington.

So, whereas Oregon, and if you look at -- well, let's just look at this and notice that it's a little bit, you know, it's a little bit tougher in California than Oregon, which has a lot more coal in its mix in terms of out-of-state coal, significantly. If you do have coal in your mix you have an opportunity to get more significant reduction.

And Washington is a little bit more like California in that respect. But if you've heard that Governor Locke recently announced a target of 10 percent below 1990 levels by 2020. There's also a boost from the aluminum industry that's basically shut down in the northwest, and has a number of associated emissions with that.

DR. SCHNEIDER: Clarification. You have CO2 equivalence; I presume you're not changing the equivalence over time, where you're doing it at baseline level? There's no feedback from these policies on the other things?

MR. LAZARUS: All right. Let me just clarify on that that the -- I wish we hadn't put the E in there. The E in this is very small. Okay, it is equivalent because we're looking at energy fossil fuel combustion only.

DR. SCHNEIDER: Okay.

MR. LAZARUS: The modelers back in Boston wanted to include the little bit of methane and nitrous oxide that comes from fossil fuel combustion. It's not the major source of either methane or nitrous oxide.

So it doesn't really confuse matters much; it's a 1 or 2 percent effect here, whether you choose 20- or 100-year global warming, whatever.

DR. SCHNEIDER: It's a micro E.

MR. LAZARUS: Right, it's a micro micro E.

(Laughter.)

MR. LAZARUS: So I can duck that question for now.

Here the numbers laid out before you, but in the interest of time I'll let you scan them on your own and get to the finishing slides because I want to keep us on schedule here.

But just to clarify, in the case of California that it's not shown here. We should have a line here that said basecase growth relative to 1990. Our basecase showed growth of about 40 percent between 1990 and 2020 in emissions.

Our further analysis has shown that's probably an over-estimate, significant over-estimate. It's probably closer to 30 percent. It's significant in terms of relative percentages, although not that much in absolute numbers for a number of reasons I'll get to in a moment.

And this shows that it gets you to 3 percent above 2000, 7 percent above 1990.

Okay, I'll skip over the differences among the states, because we're focused primarily in California here. And our simple cost analysis, which looks at the cost of the measures, amortized suitably; and the fuel reductions, fuel cost savings they may result in.

And you find that not surprisingly the efficiency programs are the ones that give you the big economic boon, similar to the way efficiency programs have tended to in the past. Assuming that history repeats itself there.

And over here we're seeing, I believe that should -- yeah, the LDV greenhouse gas standards, basically you'll find that even the Pavley reports that have come out of Cal-EPA and CARB show a very significant cost gain or benefit from -- direct benefit from implementing these improvement measures.

The other ones are a little bit, are not as dramatic. These drive the overall results, the annual results between now and 2020, discounted at 5 percent. That ones that end up looking more costly are the electric carbon policy, which by its very nature, imposes a cost on the system.

And if you're already gotten your energy efficiency out of the system before you've applied the electric sector carbon policy, it's going to cost to switch from coal to natural gas, which is largely what's going on here.

And the other thing is the alternative

fuels. Ethanol and biodiesel, which are more expensive than fossil fuels today on a direct cost basis and are likely to remain so for some time, although we did do the analysis when estimates of -- but, of course, you know, it's ephemeral -- gas prices estimates were like $1.50 a gallon. So this is comparing it against $1.50 a gallon gasoline. So maybe that comes up.

You know, I can answer questions about our cost/benefit analysis and what we assumed if we get time to open it up for questions. The bottomline is if you put it all together, driven largely by the light duty vehicle GHG standard across the three states, which is about half the total net benefit between now and 2020, another quarter comes from efficiency programs, and renewable portfolio standard is roughly break-even.

If, you know, based on, I can again talk a little bit about the assumptions; they're documented in the report. Electric sector carbon policy and alternative fuels being the major net cost --

DR. WAGGER: Can you clarify, just what are the units on the dollars?

UNIDENTIFIED SPEAKER: Can you come to a mike?

MR. LAZARUS: What are the units in the dollars he was asking. Oh, my gosh, my apologies, billion dollars, I think 2004 dollars.

DR. WAGGER: In each of the given years and then cumulative in the last column on the right, is that correct?

MR. LAZARUS: Indeed, yes.

DR. WAGGER: Thank you.

MR. HERTEL: Mike, what's in the electricity sector?

MR. LAZARUS: What's in the electric sector here?

MR. HERTEL: Yeah, is it just IOUs, or is it all --

MR. LAZARUS: It's the whole state.

MR. HERTEL: -- all LSEs?

MR. LAZARUS: We did not look at that fine grain. We looked at statewide; we looked at sort of NEMS model results for the whole state. All three states. We did do state-by-state results in this -- basically we did three states together, broke it down a little bit by state because there are different avoided costs by states. A little more expensive here in California to generate electricity.

But we did not look down to the individual load-serving entities and try to model on that basis. So, if you do so, again, this is very initial sort of framing analysis, you need to look deeper.

MR. HERTEL: I assume we'll hear more about that from your colleagues?

MR. LAZARUS: You'll hear probably a little bit more from Stacey on that.

MR. HERTEL: I'd also be interested in the carbon leakage problem. You know, I don't know what measures you apply there, but I don't know how that would affect dispatch throughout the WSCC, throughout the Western States (sic) Coordinating Council.

MR. LAZARUS: That's an enormous issue. We dodged that bullet here by just trying to model a west-wide electric sector carbon policy. So in this run of the model we assumed that the whole western, WSCC region was subject to this carbon cap and trade policy. That is not the likely initial reality.

(Laughter.)

MR. HERTEL: Makes it a little bit easier, didn't it.

MR. LAZARUS: Yeah, we need to do some illustrative -- and we caveat it in the -- extensively in this report, that that's not sufficient. That leakage is a big issue and you need to deal with it. And I think that's going to be a topic of discussion for this afternoon.

MS. PULLING: Just a followup on Mike's question. If you somehow magically remove the rest of WECC, does it -- and focus on the three-state region, does that then make electric sector carbon policy less cost effective, more cost effective, or for only less effective because there's leakage?

MR. LAZARUS: Well, again --

MS. PULLING: In other words, does it affect --

MR. LAZARUS: -- again, I --

MS. PULLING: -- cost and emissions or --

MR. LAZARUS: -- I don't want to preempt what Ned and Stacey and --

MS. PULLING: Okay, --

MR. LAZARUS: -- David --

MS. PULLING: -- tell us --
MR. LAZARUS: -- are going to talk about.
MS. PULLING: Okay.
MR. LAZARUS: People are going to look at that. It's a very complicated -- it's a very good question, a complicated one to answer, because then how do you draw the line. Are you still getting electricity from Utah and Nevada? Reality is you are. If you were just to circumscribe the states, how effective would it be? Would it be worse for leakage or better for leakage?
We ducked that issue here.
DR. SCHNEIDER: Yeah, Schneider again. I want to focus on the 500-pound gorilla, the greenhouse gas standards in transportation; it's the biggest number up there.
Is that essentially just fuel cost savings to consumers? Or are there multiple components to that number? Or is that going to get unpacked later?
MR. LAZARUS: Well, it won't get unpacked later by me. That's a very important question. All we're looking at here is the

incremental cost of the technology to basically reduce the GHG emissions either air conditioning systems or fuel trains -- drive trains.

And we took that information from the CARB studies as they were back then, a snapshot in time. And then the fuel cost savings.

In terms of any secondary impacts or -- I'll note, let me just -- in the next slide I sort of talk a little bit about what's not in these cost/benefit numbers.

And what's not in there is environmental co-benefits that may be driving some of these policies. I'll just mention that, of course, ethanol is in the fuel mix here in California now partly because of environmental reasons, other than greenhouse gases. Although there is a slight greenhouse gas benefit, as well. That may drive some of these policies not included here.

Indirect macro-economic impact. Like the respending of energy savings on local goods and services. You get down to efficiency, you save fuel, you got more money in your pocket, you spend it in the economy. How much of it goes to goods and services generated out of California. A macro-economic model would provide you some inputs on that. We didn't go there.

This is, again, a very simple initial framing analysis. Consumer response to changes in energy prices, or responses in equipment cost prices. You know, if a car costs $1000 more, $800 more. If energy prices go up for electricity in response to the standard.

There is going to be some -- there are going to be rebound effects potentially. Probably those aren't as large, you know, the literature tends to point out that rebound effects and so forth are, you know, an order of magnitude less than the primary effects we've seen before. But a full analysis should consider that.

Investments in job shifts, another category that wasn't looked at. The effects of reduced demand on gasoline, natural gas and other fuel prices. The scenario we looked at, through the various measures, mostly on efficiency, reduced natural gas demand on the west coast states by almost 20 percent.

If you look at the modeling studies that have been done, to the extent that you reduce pressure on supplies by reducing demand, prices go down. There's a consumer benefit there.

So there's a potential consumer benefit, moreso for natural gas than a globally traded commodity like gasoline, but there's a potential there, too.

MS. DUXBURY: But you said --

MR. LAZARUS: Let me just take one -- one question now -- let me try to get through, in the interests of time if you can hold your questions till the very end, so okay. How do you want to -- do you want me to just keeping taking all the questions, Susan? I'm happy to do so, not worried about time.

MS. BROWN: It's okay.

MR. LAZARUS: Okay. So, here, there and in the back.

MS. DUXBURY: But you said earlier that part of the electricity sector would be sort of a switch from coal to natural gas, which will put some upward pressure.

MR. LAZARUS: Right.

MS. DUXBURY: I assume the energy efficiency RPSs will put downward. Do you really think net/net? You're going to have a decreased demand in the region for gas as opposed to an increase in demand.

MR. LAZARUS: That's what our analysis indicated for this.

MR. KNIGHT: Michael, you're projecting 10 percent cellulosic ethanol, or at least proposing that, rather than corn ethanol. Are the price projections highly uncertain?

MR. LAZARUS: Very, very uncertain. And, you know, I'd caution that throughout, you know, on some of the elements of here there are fairly large uncertainty ranges on some of the costs, particularly for alternative fuels.

We don't know. I mean, there's no commercial scale cellulosic ethanol facility. So that was more of a notional analysis. Greenhouse gas benefits are far greater than with corn-based ethanol, but there's a fair amount of uncertainty of how soon. So that comes in the scenario late, you know. It phases in out to 2020.

But take that with a grain of salt. We don't know how much that's going to cost. We don't also know, large scale use of biodiesel means transitioning away from where you get your biodiesel right now. Waste, you know, waste vegetable oils into dedicated crops. There's some uncertainty about, you know, the cost of that scale, no question about it.

MR. ADLER: Dan Adler with the CPUC. Would you go back one slide? Looking at the electric sector carbon policy line. I know this is a function of the way you designed your study, ending with the carbon policy as opposed to leading with it.

But looking from the standpoint of a policymaker, why would I ever attempt that policy initiative if I've already got an efficiency program. I already have an RPS. Looking at that line, I have limited interest in pursuing that policy strategy.

Speak to that, if you would, and also if you've seen any work or done it, yourself, that reverses the order, leads with the carbon policy, then you see what efficiency in renewable investments fall out of that.

MR. LAZARUS: All right. That's a very interesting, important and complex question. The answer to the simplest part is you've got measures that promote efficiency, that promote renewable energy, but there's nothing here that incents natural gas over coal.

And if you want to have that a component of your policy mix, to send a market signal, as well, that's largely what you're getting out of an electric sector policy that's pursued after you've sort of wrung out the efficiency and renewables out of the system.

Now, why would you want to do that? You might want to do that because the price signal and the way that you implement a cap and trade system, or electric sector carbon policy may not be as effective in sending, being able to incent and make efficiency programs happen for a number of years.

The price signal, itself, energy prices, themselves, haven't, you know, been sufficient to create the energy efficiency response. That's why you have energy efficiency programs. So there is a rational for going first with efficiency separately.

The same argument could -- a similar or different argument could be made for renewables, that since this is partly technology development, you want to see renewables in your mix because of other policy objectives, not just global warming, climate change. But you might want to do that separately.

And you're not sure whether that's going to happen if you sort of roll the dice with the cap and trade. So there's reasons for that. But, of course, if you're considering this de novo you should look at all the variants.

And, you know, I'm not convinced that there's a good model, including NEMS, that can sufficiently get all the efficiency out of the system through -- or represented correctly, how it would respond to these kind of systems. There's a lot of nuances in the carbon policy.

So, in this context it's largely focused on fuel switching away from either, you know, to more efficient coal plants, to more efficient within coal, and to more efficient natural gas within natural gas. And over time, carbon sequestration.

Does that answer the question?

MR. BEEBE: A followup question with difficulties with your modeling. In only going to 2020 you perhaps put some artificial barriers to policy decisions that could make differences farther out, particularly with capital-intensive stock.

Could you speak to that a little bit?

The obvious question is if I reduce the -- if I increase the efficiency of my coal plant by 20 percent it looks real good in the short term, but in the long term it might not do as well for the overall carbon.

MR. LAZARUS: Okay. Well, to unpack the question there's several things going on; you bring up several good points. One is potential lost opportunities. Is that what you're implying with the last point?

MR. BEEBE: Exactly.

MR. LAZARUS: Okay, so you have a -- and here, you know, it would be ideal to go out just with a probablistic model that ran a number of different scenarios to see what different trajectories and different choices would mean as you hit these forks in the road.

Do you improve the efficiency of the coal plant, or do you scrap it all together. Or do you, you know, invest in sequestration instead. This kind of analysis we sort of upfront chose the policies rather than let some sort of -- ran a whole bunch of different policy variance.

So it's hard to know whether it makes sense in the long run to improve the efficiency of your coal plant rather than go to something else.

The other point is how you deal with capital intensive -- that's the other element to this analysis one has to do is sort of an investment impacts analysis. What is the total finance you need to make this scenario happen. Because a number of these investments in renewable and so forth require financing. What are the impacts, what do the capital markets look like and so forth.

And in that back? Was there -- okay. All right.

So, I'm going to try to wrap this, then leave room for questions. Because I think I'm getting into next time here. So, moving right along.

Strategies not analyzed. I think you'll probably hear about all sorts of strategies when Ned talks about what's possible. We didn't even look at the kind of things that are being implemented today in California, diesel anti-idling, green buildings initiatives. There's a whole host of things that if you want to go farther than these scenarios indicate, there's dozens more. Especially if you look beyond energy, you look beyond CO_2.

MS. PULLING: Just one clarifying question.

MR. LAZARUS: Yes.

MS. PULLING: I notice one of the bullets there was fuel switching from coal oil to gas as a strategy not analyzed. I thought I heard you say, but maybe I wasn't hearing you correctly, that that was one of the main elements of an electric sector policy.

MR. LAZARUS: Yes. I should have clarified. That's in buildings and industry directly.

MS. PULLING: Okay.

MR. LAZARUS: I'm not clear that given the little amount of coal and oil use there is left in California in buildings and industry you actually get very much from that here. But, I think Ned and Stacey and others have probably looked a little bit into that.

MS. PULLING: Thanks.

MR. LAZARUS: Just to summarize the ten strategies we found can reduce west coast emissions to 1 percent below the 2000 levels by 2020 while the economy grows, as we saw in that chart, provide nearly $40 billion in NPD savings through 2020 on a net basis with all the caveats and uncertainties.

You've got some big efficiency winners that you can potentially pursue that in a sense you want the effects of some of these other policies we looked at thus far in the near term. And could lead to deep reductions after 2020 through the full effects of vehicle standards, market development and so forth.

But again, this is not your long-term transition study. This is what can you do with near-term policies, near- and mid-term policies to begin to turn the corner. And there are other strategies that are available.

Yes, Robert -- Michael?

MR. HERTEL: Mike Hertel with Edison. I just wondered, coming back to that carbon leakage problem, did you assume for the energy efficiency and RPS measures going into place prior to the carbon policy for the electric sector, that those also apply to the western state region, not just to the three states?

MR. LAZARUS: Good question. There are many layers to that question. The first order I'd say no, we did not. We assumed that these three states largely go it alone.

But when you get to modeling, and this is, I think what Ned and Stacey and David are going to talk about, is you have to think carefully about your assumptions about what other states are going to do because it's going to affect the outcome of what's possible.

They have an RPS, too, and you can source out-of-state renewables from California. That's going to create price pressure on those same renewable resources. Again, this is simple and indicative, so we didn't get to that level of nuance here. Not nuance, it's important, but we didn't.

MR. HERTEL: Just so I understand, though, it sounds as though what you did was on the cap portion assume that the cap applied western-state-wide, for a better way to say it.

MR. LAZARUS: Yes.

MR. HERTEL: And on the various efficiency measures for the electricity sector you assumed that that would be what would be done by the three states.

MR. LAZARUS: Okay, let me clarify that.

All the results that you saw are the effects that the emissions reductions and costs that would be translated to the three states, okay. All right?

MR. HERTEL: Yeah, but I mean it's obvious that if you don't apply those efficiency measures in the remaining western states that has a huge effect on price pressures for electricity throughout the region.

MR. LAZARUS: Yes, yes.

MR. HERTEL: And yet, at the same time, you've conveniently assumed simplifying assumption that in a cap program there would be no carbon leakage, that there would be in fact a cap over the entire western region.

MR. LAZARUS: Okay. Again, we didn't quite assume that there would be no leakage. And I think these are all very good questions, but I'd like to sort of postpone that discussion because this was just a very first order snapshot. We recognize and caveat fully in the report that the issues that you raise are extremely important and require more detailed and thorough and vetted modeling analysis which you are about to get into.

DR. SCHNEIDER: Steve Schneider again. Another one of these academic questions because I know, since I hang out with --

MR. HERTEL: Not that there's anything wrong with academic questions.

DR. SCHNEIDER: Right.

(Laughter.)

DR. SCHNEIDER: -- since I hang out with economists and we argue all the time, I can hear one or two of them saying, wait a minute, anytime you intervene there's always a positive cost. Meaning that they buy into the notion that there's no no-regrets.

I think that's wrong, nevertheless it's a hot argument. So the question as to how do you achieve these savings, which are positive savings, involves assumptions about preexisting market failures.

So, which is going to get you into a debate with them, and I'll bet you are right. But the question is where do the numbers come from, and sort of how uncertain are they. Because when you have two decimal point precision up there, and there's a whole paradigm of characters who believe that you start at zero and you never go below zero on a supply curve, wrong as they may be, it could cause trouble with the acceptance of the analysis down the line.

And sooner or later you'll need to confront that issue openly and argue why your numbers are better than their belief.

MR. LAZARUS: Very well said, I'm not sure I even need to respond to that, because I think you pointed out that there still is, lingering, this top-down versus bottom-up, --

DR. SCHNEIDER: That's right.

MR. LAZARUS: -- and the no free lunch versus free lunch. It pervades. All I can say is that, you know, evidence shows that we've seen market failures, we've seen economic benefits. Can you deny that energy efficiency has been good for the California economy.

And so, I mean that says it sort of in a nutshell. Now, there are, as for the number of significant digits in the analysis, we tried to keep them to an absolute minimum, sometimes saying, you know, 2.4 versus just saying 2. Well, I think it's hard to see how the totals add up from a math standpoint.

Arguably there's a fair amount of uncertainty, but there's no arguably no greater uncertainty here than what the economists, in their models, using the top-down models that assume that you can only cost the economy have in their models.

So, arguably, I think it's equivalent.

DR. SCHNEIDER: I agree. Let me just follow up one second because if you run their standard models, typically (inaudible) model top-down, what you're going to find is the most efficient policy is the only one you had on the board that was negative.

Now you're going to assume that all the other policies, because they have a narrower base than a carbon tax, spread throughout the economy, is therefore going to be less cost effective than just simply having a planetary scale tax.

And all their models show that because they're implicitly embedded in them that there's no no-regrets.

If you go into those models and you impose that there is some inefficiency, then you end up with a mixed strategy being more cost effective than just a top-down.

But I can imagine a number of academic economists going after this on exactly that grounds. So when you prepare the final report probably better take that one on really explicitly.

MR. CAVANAGH: And in doing so there's a superb appendix to the National Commission Energy Policy Report which addresses market failure, energy efficiency and renewables, which you might just want to pick up, Michael.

MR. LAZARUS: Good point. All right. Thanks.

DR. SCHNEIDER: Don't rehearse that argument all over again. Preempt it. That's what I'm advising you.

MR. LAZARUS: Okay, good point. All right.

So I am going to just show you what's in the rest of the presentation, but I'm not really going to talk you through it because I don't want to further impose on Ned here.

So what we did is we looked a little bit, but it'll help perhaps tee up what he has to say. We did some further revision of the basecase emissions for California since August report based on input we got from CEC, from folks in CARB.

More recent forecasts have been done on the electricity. More updated consideration of fuel sources and data issues. Recently improved our implemented policies like the CPUC. If we assume that the Utility Commission's energy savings goals were achieved by all the utilities, include that in the basecase, you get a considerable benefit.

The other thing is that the -- and I'm going to skip this slide, and just show you the revised projection that gets you to 32 percent, and point out just a couple of interesting little things.

One is we included all the other gases for better or worse. We went with 100-year global warming potentials and the standard way of putting the six gases in the basket together, albeit flawed and imperfect, it's what, you know, it's what's going ahead in a number of policy fora and policy measures including the Kyoto Protocol.

That fluorinated gases appear as a major slice increasing over time. And this is largely for air conditioning and cooling applications in new vehicles and other places.

But what you also see is more interestingly jet fuel use, which we previously projected quite high, comes down, and that's the

9/11 effect. Is that it sort of reset, set back air emissions growth by about three or four years.

There are a number of other things which have to do with probably forecasts of fuel prices that have rippled through this. And as a result the challenge is still enormous, but not quite as significant as we pointed out in the study.

So, that said, the contribution is still a major contributor onroad gasoline. This is growth, 1990 to 2020, basecase projections. And there's this other all-use category which has to do with fuel switching away from oil to natural gas. There's been a net benefit to the California greenhouse gas picture. Largely it has already happened, in the early '90s. Some other reductions in oil use.

The big challenge is gasoline; jet fuel use still a big challenge. HFCs, big challenge. Electricity, when you include imports, a big challenge. And diesel use.

So, I'm going to leave you with that as clearly the enormous challenge you folks face, and thanks for your patience.

(Applause.)

MS. BROWN: I'm going to ask Ned Helme

to join us at the podium. And thank you, again, Michael, for, I think, a clear explanation of what's proved to be a very complex set of issues.

(Pause.)

MR. HELME: Great to be here again with the Committee and really appreciate the opportunity to talk to you about this stuff. I'm going to build right on where Michael left off. He teed it up very nicely for our presentation.

Tell you a little bit of what we're going to do today. Before lunch I'm going to tell you sort of the big-picture focus again, sort of build on that last slide Michael talked about of where are the opportunities, where is the growth likely in terms of emissions. And so then which sectors do we really need to be thinking about in terms of our opportunities to make reductions with the plan.

Then I'm going to turn to Dr. David Wagger, who works with us, a chemical engineer, and he's going to talk about the cement industry and the oil refining industry, and also the manure digesters opportunity. So we've got three areas we've looked at in detail.

As Mike indicated, the Tellus analysis

is the top-down kind of look; and we're going from the other end, trying to take a look at their numbers and go from the bottom up, looking in depth at each of these sectors. Trying to figure out what a supply curve looks like; where those opportunities are; what the costs look like and that sort of thing.

As you'll see in the analysis as David gets into it, like with oil refining, a lot of emissions there, a lot of uncertainties, lots of questions. As we dug into this you find out that, for instance, a lot of analysis has been done on CO_2 and utilities, a lot less analysis has been done on a lot of these other sectors. So a lot of this, we're breaking some real new ground here for you all as we go through it.

So then after lunch Stacey will come up and she'll talk about, we just got yesterday from Tellus, the first runs of the reference case for our utility analysis. So the questions that Michael was asking in particular, and Wendy, as well, will come up.

And really after today we'll give you a sense of what the assumptions were that we got tentatively from the working group. And what those numbers lead you to in terms of the first look at the reference case.

But we'd like some guidance from you today about are those the right assumptions to use. And then some guidance in terms of what scenarios we want to run. We have some we've set up that came from the working group. We want to be sure this group is comfortable with that.

A lot of Michael's questions go to the heart of how do we design the analysis. Do we want to look at renewable portfolio standard, energy efficiency first and then go to the cap. What do we want to assume about other states.

We'll definitely be looking at this from a California perspective, so we'll be modeling this based on the load-serving entities in California. So we'll be looking at California's demand, and at least ostensibly starting with an assumption that nothing's happening in those other states at the plants that aren't serving California.

Now, if we want to analyze it differently, we can. We've got the model set up to do that. But I'll be looking for your all's guidance today in terms of how you would like to see this analysis laid out. Because, of course, we'll get those results in April and at the later meeting, and that'll be the basis for our discussion.

So it's real important we focus on the assumptions and the scenarios today in terms of electricity analysis, and also this question of linking it to industrial sector. We're poised, I think, to be able to build in some supply curves for cement; maybe for refineries. David will give you some of the (inaudible) and you can judge for yourself whether we can get there or not from here. But it will give you a feel for what the possibilities are. So that's kind of where I'd like to take this in the course of the rest of the day.

Okay, this goes back to Michael's last slide where he was talking about where is the growth. This is looking at the 1999 emissions inventory for California. And note at the bottom here that this does not include out-of-state electricity, okay. So instate power is here, 57 million tons. That includes all the cogeneration, which is the bulk of this, about 7 million tons from utilities, about 50 million tons from cogenerators. So, very big number there.

The part that comes from the Four Corners Plant and other coal plants outside the state is not in this graph. It's 54 million tons according to the Tellus analysis. And when we run the analysis we will include that.

But just to give you a look at California's pie, by itself, and obviously transportation was by far the biggest. No surprise there. That includes jet fuel, that includes freight, that includes ports, that includes light duty vehicles, et cetera. Okay.

Then in terms of the other sectors, you can see the next largest after electricity and transportation is industrial. And, again, this is direct emissions onsite; this is not cogeneration emissions. This is emissions onsite, refineries, cement and other areas.

And we have residential, commercial, which, again, is fuel use by residential and commercial entities. Not electricity, again, you know, just natural gas and a little bit of oil and coal that is used.

Cement production is the process emissions from cement. The fuel emissions are in the industrial piece here. And the others are pretty straightforward. The other one to note is substitution of ozone-depleting substances. It's very small in 1999. When I kick down to the next one you see it jumps dramatically to 31 million tons; one of the biggest growth sectors.

You can see overall the picture is growing significantly. Transportation keeps its big share of the total pot. Same way you can see industrial growth a bit more now. I caution you, the numbers on commercial, residential, industrial are simply interpolated. The current data we've got doesn't break it down. We're going to try to break that down more carefully. We've got it for refineries, but not for the industrial sector as a whole.

And then this is a look at -- this is the bigger picture. I'll move over here so I can see a little better. This is the picture relating it to what you might think about as possible targets.

MR. CAVANAGH: Now this is an important clarification. I just want to make sure I've got this right, because this has been confusing to many of us.

Obviously from 1990 to 1999 California emissions look like they barely grew, about 3 percent. Then suddenly in all of the projections you have this leap forward. You got a 10 million ton growth from 1990 to '99. You got a 75 million ton projected growth through 2010.

I think, but I want to confirm with you, that most of that is including out-of-state emissions in the second and not including it in the first.

MR. HELME: No, that's not --

MR. CAVANAGH: But that's not what it's doing?

MR. HELME: This is without out-of-state emissions at all.

MR. CAVANAGH: You're still leaving the out-of-state emissions --

MR. HELME: Down here we add them in. We'll show you --

MR. CAVANAGH: Okay, but then what --

MR. HELME: -- the purpose of looking at this --

MR. CAVANAGH: -- what is the 2 cent --

(Parties speaking simultaneously.)

MR. HELME: And there's not much

movement in utility emissions in California. In fact, you'll see in the Tellus --

MR. CAVANAGH: Okay.

MR. HELME: -- they tend to decline a little bit. So this is really growth in -- transportation, and some of the industrial sectors. That's where the big growth is happening.

MR. CAVANAGH: So the short story is that sevenfold difference in the level of growth, 10 million tons in the '90s --

MR. HELME: Um-hum.

MR. CAVANAGH: -- to 75 million tons in this decade is all about more normal -- what you regard as more normal economic conditions?

MR. HELME: Um-hum, right.

MR. CAVANAGH: Okay.

MR. HELME: David, did you want to add --

DR. WAGGER: Yeah, I just want to add that the thing is Mike mentioned between 1990 and 1999 the California economy declined and CO2 emissions declined, and sort of hit a minimum in the mid 1990s. And then they're trajectory up.

So, the far away actually between the

399 and 408 there actually may have been a lower minimum between them, and they're going up. So that might be part of it, as well as what Ned said about increasing transportation.

But lesser increases or outright reductions in other areas that compensate. But as you go forward, transportation becomes increasingly important. I think that might be part of what you're observing.

MR. HELME: Mike, do you want to interpret on this, too?

MR. LAZARUS: (inaudible) did hit a minimum in like 1994, 1995, I believe. And that was the period of economic stagnancy in California was '90 to '94 or so. So, you see that, and then it switches over.

MR. MARK: Well, the Governor will be glad that you've banned recessions --

(Laughter.)

MR. HELME: The models always do.

MR. PARKHURST: Can you go into a little more detail on the ODSs that have increased in use? I mean specifically what ODSs and what uses? I mean where has the switch been, and what's had that huge --

MR. HELME: I don't know the answer. Michael, these are Tellus' numbers in this case. Maybe David wants to jump in.

DR. WAGGER: Well, if you would see the 2002 California greenhouse gas inventory most of the growth is occurring in substitution of ozone-emitting substances toward HFCs and those kinds of chemicals.

There is a national program for SF6 from transformers and electric distribution. And I think that program has actually capped a lot of potential future growth. So I think that's actually somewhat declining as you go forward.

So it's really the ozone-depleting substances that are contributing to that large growth.

There's also a program with semiconductors on some other things; I think nitrogen trifluoride and those kinds of things, which if you look at semiconductor growth, it's huge. But the increase is small because they're already trying to cap them, keep them depressed going forward.

So I think that largely explains --

MR. PARKHURST: There's a large number

of ODSs that have a lower GDP than the ones that were used. When you switch from like an R-11 or -12 to H --134A, the GDP decreases. So I'm curious as to what has been such a huge increases is kind of, kind of the next level down, where is that.

And then I guess a followup question is how do you then estimate the emissions of that. Are you assuming an average leak grade? Or are you doing -- is it some level of purchases of ODSs?

UNIDENTIFIED SPEAKER: I personally don't know the answer to your question because I don't know how that number was calculated. But you have a good point. You need sort of the difference between what the ozone-depleting substances contributes; subtract that out; but add back in the HFC that's replacing it.

I'm assuming that's what happened. But I honestly didn't calculate it, so I don't know the answer to your question.

MR. HELME: Michael, do you want to jump in on this?

MR. LAZARUS: Yeah, I can speak a little bit to that. If you look at the California inventory you'll see that it's very hard to figure out, first of all, 90 percent of what you're seeing going on there with it is the substitution of hydrofluorocarbons where you used to have CFC. Which because of the Montreal Protocol have been -- are being phased out in the United States.

So you see them going in at mobile air conditioners; you see them going into stationary air conditioners.

The second thing, yes, you're correct. Many CFCs are potent greenhouse gases as well. But they're not part of the basket of six gases that are looked at in Kyoto. And the Kyoto gases, which is translated into how countries do their inventories, there's a whole story to that, which is not to confuse the two protocols with each other.

But the fact is that it looks ironic. Jeez, we're substituting these ozone-depleting, but we're creating a global warming problem. That's not quite right. As you're pointing out CFC is what we used before, also, were potent greenhouse gases. We just don't count them.

And so it's largely mobile and stationary air conditioning equipment. The estimates have been done at a national level, and carried down to the state level as a percentage of national population.

And I haven't seen in all the state inventories, state work that's been done, anything that's really state-specific in that. Other than say the work of CARB when it comes to Pavley regulations.

MR. HELME: Question in the back?

MR. WICKIZER: Yes. Just a question --

UNIDENTIFIED SPEAKER: Could you come to the mike, please, can't hear you.

MR. WICKIZER: I guess the question is t how --

UNIDENTIFIED SPEAKER: Could you also identify yourself, sir; I'm sorry, I don't know who you are.

COMMISSIONER BOYD: You need to get to a mike. Here.

MR. WICKIZER: Doug Wickizer, Department of Forestry and Fire Protection.

How did population figure into that? And are you looking at it on a populated effect per capita when you did --

MR. HELME: Population's factored in. I don't know what numbers you used, Michael.

MR. LAZARUS: We just used the state numbers that underlie the forecast. So we didn't do any -- I mean per-capita numbers might be useful to reflect, but --

MR. HELME: Okay? My point with this slide is really to talk about what is the level of reduction we need to be shooting at, depending on what target we think we're trying to get to.

So the point here is really to look at that. So, you see my second set of things here. To reach 1990 levels you'd need 84 million tons by 2010. You need 141 million tons by 2020. And so if you try to get to 1999 levels, in other words stabilizing at the old CEC inventory level, here are the numbers that are involved there.

And, of course, you got to add, back to Ralph's question, you got to add in the piece that is the growth due to out-of-state coal sales and other power sales that come into the system.

But I think as we think about this, as we're thinking about options throughout the process, I found this works very well with international process as well, you really want to think about where you're trying to get. And then you can evaluate which options make sense and how they fit together.

And those prices will try to build supply curves that give you prices at different levels. And, of course, as Steve indicated earlier, there's lots of uncertainties. And you'll see them when David presents some of the stuff on cement.

But, bottomline, we want to think about this, is these are pieces of the pie. Which pieces do we think fit together to get us to where we want to go. And I should note, these are levels 1990 to 1999.

If we're looking at this on the international level we talk about the scenarios that Mike showed from the IPCC, when you talk with the Dutch or Europeans, they're talking bout 30 percent below 1990 as a European-wide goal by 2020.

So they're looking at much more aggressive than what I'm showing you here. I'm showing you just getting 1990 by 2020, and getting the 1999 by 2020.

So there's a wide range of choices here. And that choice derives your answer in terms of what you've got to pick. And, of course, drives the cost picture, as well.

So the reason for the Dutch and the others looking at this 30 percent is they're still trying to get to a 2 degrees Centigrade maximum increase in temperature, and they want to be at the 450 ppm level.

So to do that it takes a lot more effort; 550 is a lot easier than 450. But that's the kind of thing we're talking about. So as this group thinks about this, you got to think about it in context with where are we trying to get.

It's not just, well, that one sounds interesting, you get 2 million tons from cement, let's do that. It's really about how these pieces fit together and what have we got at the end of the day. We've got to always be aware of where we're trying to go in the larger scheme of things.

Okay, here's again a focus again on Mike's slide about where is the growth. Where is that growth occurring. And obviously transportation is the biggest from 210 million to 285. This is basically light duty vehicles and freight and jet fuel, as well.

Electricity consumption. Here I'm showing everything, Ralph. This is the base with the imports included. And we're again using here, this will be drawn in Stacey's work later, the modeling that Tellus did on the basecase. We're looking at something like from 111 to 135 to 140 million tons by 2020 as a result of the growth that's projected for both California demand. And the basecase projected is something like a 35 percent increase in demand for electricity California-wide.

And interestingly, the WECC overall growth in CO2, if you do the modeling for the overall region, is again about 35 percent by 2020. So pretty similar thing. And we already mentioned ODS substitution.

Then the last one is, of course, this non-electric fuel combustion, which is residential, commercial and industrial; 89 to 106 million tons. So those are your big opportunities really.

Now they may not turn out to be the most cost effective opportunities. But, again, thinking about this from the top and sort of saying, all right, where do we want to focus first. Where are our best shots at getting reductions. And we'll look at the cost and see if it makes sense.

It may turn out something else is small but very cheap. We'll grab those, of course, as the way to go.

So I think this is helpful just as a way to think about this as we proceed as a committee.

Okay, quick look at these opportunities. In the work that Mike presented on the three states, for example, in the transportation section. He mentioned that several of the options weren't included in the analysis. They looked basically at Pavley-type tailpipe standards, a little tougher, I think, than the Pavley-type standards assume.

And he looked at some things with fleets, that sort of thing. Did not assume a lot for smart growth and VMT reduction from those kinds of programs. Did not do a big look at freight or at aviation fuel. So there may be some room for some more movement on the transportation sector.

You notice I showed 75 million tons of growth. The set of options that Michael and his team put together for California and the two other states looked at about 56 million ton reduction in

California.

So without going after VMT aggressively, and freight and aviation, we were well shy of just getting back to where we were in 1999 transportation.

If we stay with that as a strategy it means we've got to crank down harder on the other sectors, industrial, power, ODS substitutes, et cetera.

So it's zero sum game here. If you can't get them in one place, you got to go somewhere else to get it. So we got to always be thinking about that as we proceed in this process.

The power sector. Obviously the big opportunity is probably out of state, as Michael noted, you know, Oregon and Washington have a lot more coal than California does. For California to really have a big impact on the utility sector we've really got to figure out a way to go after that sources that's coming in from out of state.

We will be modeling load-serving entities as an approach. The questions that Michael raised about leakage are right there. And hopefully the modeling will show you what problems are potentially there. It's not a simple shot. I mean, you know, your brokers could be selling you the nuclear from Palo Verde and the hydro from the northwest and so on, and sending in outside coal and how do we be sure about that.

So there's lots of implementation issues that we'll need to get into beyond the modeling, itself. Figure out how's this really going to work.

MR. HERTEL: And the electrons don't care.

MR. HELME: Yeah, the electrons don't care at all. Right.

Okay, then industrial sector. And David's going to take you through three of these today. As an example, we've looked hard at cement. We think maybe there's 2, 2.5 million tons a year that is attractive. There's some caveats there, some questions about whether or not you can really do cement blending, given you've got enough fly ash, you've got enough slag, et cetera. David will talk about that. But again, looks like an interesting opportunity, but needs some more digging.

Refineries, big number, lots of questions about what do you do at refineries to get those tons down. And we don't have the answer today. We'll give you a sort of a sense of what's out there and a starting point for that.

Methane reduction. We're going to talk about that a bit. We've looked at manure digesters. In our study we assumed 15 percent of the farms do this. And we get something like four-tenths to 1.2 million tons a year. Not very much.

Now if you assumed all the farms did it, you had a program that said every farm over 500 cows does this, well, obviously I can raise that number by sixfold. So I'm up at 7, 8 million tons. Getting to be pretty interesting.

Again, the design is critical. How do we do this. Is it an incentive program; are we offering incentives for farmers to do this. Are we doing a regulatory program. How are we getting at this. How are we going to access these opportunities. Are they worth accessing. What's the Committee think about that.

Okay, so as I mentioned, overview. We're going to be looking at CO2 and methane in the power industry. The industry, you know, various industrial sectors, ag, forestry and transportation. We won't be able to do every option, so we'll be looking for your guidance about which ones are most promising, which ones you really think are politically feasible. No point in analyzing an option if it's a dead-on-arrival kind of option.

You know, I remember in New York we had a gasoline tax on the table, and that was shot down the first day, you know. So it just depends on the politics of different regions where that plays out in terms of what options you want to look at.

We will not be doing the high GWP gases. I think in the PIER program the CEC has a very in-depth study that's being done. And that work will be brought to you here, so we'll have those results. But we won't be doing any independent work on the high GWP gases and the ODS substitutes and that sort of thing.

Obviously the recommendations come to you guys. Today we'll give you some sense on cement, as I mentioned earlier, on manure. And we'll give you some sense of the inventory on oil and a reference case for electricity.

Now, in terms of the way we're going at

this, each analysis will define the measures. It will look at the cost and the emission reductions that are possible from those, to the extent that we can generate that information.

We'll look at policies. And we'll look at implementation questions. And I have a sense from Susan and Commissioner Boyd that this is critical. You all really want more than just a supply curve; you want to really talk about how are we going to do this. Great, there's some tons to be gotten here, how do we get at that. What's the policy. What's going to work; what's going to get us those tons. So we're going to spend some time on that.

And we'll look at -- for any given sector we'll look at this whole set of choices. Whether it's incentives, tax credits, R&D credits, financial assistance, benefit charge money, voluntary agreements. The Europeans have had very good success in the Netherlands and Germany with voluntary agreements with industry where they agree to reach certain efficiency targets industrywide. And the trade associations manage those programs.

Cap and trade, very big. We've talked

bout that a lot today. The issue that I talked with a number of you in the little small group we did back in December on trading, the question of offsets.

Let's say for example manure digesters, we decide we can't put them in the program as a full-fledged regulatory program. Maybe they are an incentive. So they can -- we can say, all right, well, if a farm comes up with this they can sell the credits they generate into this marketplace.

An alternative might be to say set a limit, you know, the farm has to do 25 percent reduction on its own and anything beyond that is sellable into the marketplace. So there are ways to design this to take care of how much you want the cost to be borne by a given sector.

The thing to remember is if you set up, if the electricity sector is the one with the cap, and everybody else offsets, that basically says electricity sector is paying for everybody else's reductions. And the others are basically getting benefitted, if you will.

On the other hand, if you go with a broader cap and trade where cement and refineries and so on are in the program, then each of them are bearing a share of the costs. And additional reductions beyond that they can generate and sell into the marketplace.

So, again it's kind of a zero sum gain. It's a decision about where do you want the axe to fall. Who is going to bear the responsibility in the program, as you design it.

And then finally, obviously regulatory requirements, supply and standards, other kinds of standards. A number of ways of doing this, not in a cap and trade context. And we'll look at those, as well.

Also be talking to you about what criteria. What criteria does this group think are the test criteria. Cost effectiveness is the one we always start with; environmental effectiveness; feasibility administratively. Some of the stuff David will talk about with refineries, pretty tough to monitor and verify some of this stuff, you know. Pretty interesting in the terms of tons, but can we really make this stick; can we have confidence that we're getting the reductions we think are there.

Obviously political feasibility a big

one. Impact on existing policies is a big issue in Europe. Got a lot of existing policies and programs. They're very reluctant to have them changed by a new program on climates. They've designed carefully how to make that interface between the existing standards programs for efficiency and that sort of thing, and the cap and trade kind of program. It can be done, we just have to think carefully about it.

Clearly monitoring and verification is very important. We can't have a trading system if we don't know for sure what the tons are. So if you've got big problems with measuring process emissions from the refinery industry, the chemical industry, it's going to be tough to bring them in.

Example again, Europe left out the chemical industry in their cap and trade precisely because of the uncertainties about process emissions. They just didn't feel like they could have confidence that this level of reductions was really achieved. Too many variables at the start. They're looking again, they're trying to design it for the future to bring them in. But it was deemed too difficult at the start.

And then finally, effects on

international and interstate competitiveness. Obviously that's going to be a factor for many of the industry people. You know, if we're doing this in California and maybe Oregon and Washington, does that disadvantage you in other states. How high is that cost. We have to think about that, how do we build that in.

And then, of course, there will be other factors we all would like to see.

Okay, so desired outcome, what we hope to have out of this is really to have sector-specific analyses that will give you a good identification of promising approaches. We'll really try to look at the level of effort required to meet the various goals.

And we're looking for integrated strategies. So once we decide we like cement; we think there's too many tons; we really want to go after it. Can that be integrated into a cap and trade program. Or is that a stand-alone program. Or how do we link those.

So we're going to really want to try to think about, towards the end of the process, how do you bring these programs together. They aren't just stand-alone silos. They ought to be linked in some fashion to make it a more integrated and carefully thought through climate program.

So that's kind of the big picture. I'd be glad to take any questions. And I'm going to call David up here and he'll talk more specifically.

Michael.

MR. HERTEL: Will you be able to tell us -- this is Mike Hertel from Edison -- will you be able to tell us which assumptions are most sensitive to results output?

MR. HELME: Um-hum.

MR. HERTEL: Good.

MR. HELME: Yeah, in terms of the modeling we will. And we'll do some -- we plan to do some sensitivity runs, like change the natural gas price, change the assumptions about what energy efficiency programs will get.

We know from doing this in other states certain assumptions derive big changes, and others are not that important.

MR. CAVANAGH: To my colleagues at the Energy Commission, I renew here an appeal I've made the last two meetings, we're making slow progress but we're not quite there.

We should be keeping two sets of books as we outline how these proposals are emerging and what the emissions profiles look like.

And the out-of-state electric generation matters a lot. It's a 60 million ton item in a 400 to 550 ton pool. If going forward, reports like this -- and, Jim, I think this is really a question of the Energy Commission, but I just -- you really would, I think, serve everyone better if there were a common metric and you just said we're going to include the out-of-state tons; we're going to restate all the numbers to include the electricity imports; and we're going to show both current emissions, past emissions and future emissions with those included.

Because right now, we're now at a state where we're keeping two sets of books, and sometimes it's a footnote at the bottom of the slide. But it's confusing.

MR. HERTEL: Ralph, if I could, it would seem really informative to have both sets of books, if I could put it that way. I would like to know a propos of Wendy Pulling's question earlier what would happen if you didn't assume that you were able to control the out-of-state importation of power. That that would go --

MR. CAVANAGH: But that doesn't require two sets of books. What --

(Parties speaking simultaneously.)

MR. CAVANAGH: That is a reasonable question and I accept it willingly. But if you've got -- the point is California emissions include electricity imports. Any fair assessment --

MR. HERTEL: Absolutely.

MR. CAVANAGH: -- has to include them. Then you're absolutely right, when you're looking at the impact of policies, it's going to matter vitally whether you think you can get a handle on those out-of-state emissions or not.

But it doesn't require two sets of books.

MR. HERTEL: No, that's right.

MR. CAVANAGH: It requires asking and answering the question.

MR. HERTEL: Misinterpreted your phrase.

MR. CAVANAGH: So if, as we go forward, we imagine presentations like this in the future, if those emissions are -- if we can know that those emissions are integrated, and it will require restating some numbers, but that's not difficult to do, in terms of the Energy Commission's inventories for 1990, 1999.

COMMISSIONER BOYD: We've wrestled with this, and we may have to do some subtotals and then totals, some of the conventions with regard to individual states and their emissions inventory.

We have to worry about double-counting. If other states are doing their inventory, do they count the emissions they produce there? So I think we agreed almost in our first meeting that we wanted the gross number. But for other conventions, I think, sometimes we have to have a net number.

So we'll have not two sets of books, but we'll have to have two sets of data, or two sets of figures, or a subtotal/total, or something like that.

MR. HERTEL: So at least we can understand it.

COMMISSIONER BOYD: Yes, anyway --

MR. CAVANAGH: But then, Jimmy, if the default option could be inclusive, which is right now we still have a lot of situations in which we're seeing numbers without the electricity imports in them.

I don't have a problem knowing what it is. But I think the standard you're trying to set for other states is they should do it right. And it is, in fact, misleading to present a state's greenhouse inventory without including the impact of electricity imports.

(Parties speaking simultaneously.)

MR. HELME: I mean one of the difficulties here, Ralph, in terms of the data is that, you know, we have certainty about the California instate emissions. We have CMs who know exactly what's coming out of the plants.

MR. CAVANAGH: Yeah.

MR. HELME: When it comes to looking at the out-of-state emissions it's a question do you follow the contract path? In other words, we own, you know, one of the food companies owns a big piece of Four Corners. Do we take that? I mean, as Michael points out, the electrons don't necessary follow the path.

We've done in these analyses, and you'll see a great variation in the estimate of what the out-of-state emissions is depending on whether you use the WECC average, you try to follow the contract path, or you do something else, you know.

And the assumptions about transmission you'll see in the stuff we present later, you assume how much transmission there is from the northwest and how much from the southwest dramatically changes the answer in terms of what that inventory looks like.

MR. HERTEL: See, Ralph, I think --

MR. HELME: So, I agree with you completely from a policy standpoint, but --

MR. HERTEL: -- the worry I have --

MR. HELME: -- the problem is that there's quite a variation in terms of those numbers because it's not as clear cut.

MR. HERTEL: The worry I have is you could adopt a policy here in which you pay for the reduction from imports out of state, but in fact it doesn't change dispatchability of the plants at all. So that the amount of carbon going into the atmosphere is the same. And in fact, the electrons are traveling the same path as they were before.

You may have contractual fictions on top of that, but it won't make a practical difference at all.

So you end up in a shoot-yourself-in-the-foot, knee-cap, or higher situation.

MR. HELME: In the back, you were trying to get --

MR. SOLTZ: This is Chuck Soltz from California (indiscernible) Generation. I haven't been able to find the presentation material that you've been using. Is it available? Can it be made available?

MR. HELME: If they're not on the web yet, they will be shortly.

MR. SOLTZ: At the same location?

MR. HELME: Yes. Probably later today. Apologize for that.

MS. DUXBURY: I think to add, though, just because it's difficult and it does -- it's imprecise doesn't mean that we shouldn't start to really look under the hood more on this. Because we're not going to get at the leakage issue until we really understand how to measure these imports from out of state. Because I think that's --

UNIDENTIFIED SPEAKER: That's fine, that's good --

MS. DUXBURY: -- you know, as, you know, we shouldn't ignore it because it's a hard thing to measure. I think we absolutely need one set of books, and we absolutely need to include imports. And we need to start shining the light on the uncertainties that that measurement includes, so that as we try to understand leakages, which is a huge problem in the RGGI process in the northeast, we just educate ourselves and get those books more precise, rather than just have it as a footnote, or have two separate sets. And just start to --

MR. HELME: At our last --

MS. DUXBURY: -- come up to speed on that.

MR. HELME: -- meeting we agreed that all the runs, at least initially, we agreed all the runs would be including the imports. And so our plan is in the modeling you'll see the reason for going the extra mile to redesign the NEMS model to allow the load-serving entities as the basis is so that we will have modeling results that will show us precisely. That's --

MR. CAVANAGH: And just to be clear here, there is no uncertainty about the emissions associated with out-of-state generation. It's reported, it's known with the same certainty as the instate emissions.

The uncertainty lies in the convention to use in determining how to tag the imports. And, Mike, what I would say about that is we would make a contribution here, I think, if we could agree on a convention, whatever it is, for doing it.

MR. HERTEL: I don't think that's as much of a problem as the other end of the problem.

MR. CAVANAGH: Well, the other -- which is huge, but that's the policy issue of how you make sure that any reductions you think you are achieving in out-of-state emissions aren't simply leaked somewhere else. That's huge. But --

MR. HERTEL: Well, but my only point is when you try to model that effect, it's difficult to model it --

(Teleconference interruptions.)

COMMISSIONER BOYD: Excuse me, folks on the phone, any conversations you're having they are -- we can hear them here.

MR. HERTEL: They want to press the mute.

COMMISSIONER BOYD: Well, it mutes us but not them.

MR. HERTEL: The problem is how do you

model it. In other words, if you're assuming -- I know that a certain number of megawatt hours come from out of state. I can make simplifying assumptions based on the WECC average emission rate, or whatever, to come up with a relatively close -- government word purposes -- number that makes some sense.

But if I decide that I'm going to reduce that by X, then I want to make sure that that reduction is actually, in fact, happening. And you just need to be clear that, in fact, you have a way to do that, or otherwise the very likely effect, I think, is, as I say, unless you can measure dispatchability, which is, I think, going to be on least-cost basis going forward.

Some models have some capability to do that. If you have something like that, that would be really worthwhile because then you could see what the effects would be systemwide. Unless you could talk all the other states into getting into the game.

MR. HELME: My sense is from talking to the Tellus modelers we think by resetting, redesigning this we'll be able to do that.

MR. HERTEL: You might be able to do --

MR. HELME: They'll be able to see what the leakage is. In the RGGI process and the work we did in New York and states up there with ICF, it was possible to figure out what the leakage was.

We got a net number, because obviously to some degree the cap in New York, people bought more power from New Jersey. So we had a pretty good representation from ICF of what that power's characteristics were like. And so we could subtract that from -- and it wasn't as significant as we thought.

We did the modeling, though, oh, it's going to be a huge leakage.

MR. HERTEL: And then the other issue you --

MR. HELME: There wasn't as much as we thought. It was --

MR. HERTEL: -- point out is the transmission routes and congestion on those routes. The physics of that have to be understood well and modeled in, too.

It's not that you don't want to take effect of it, but you just want to know what it is that's actually happening on the ground.

MR. HELME: It's actually a little easier to do in the west than it is in the northeast, because you --

MR. HERTEL: Yeah, because we're --

MR. HELME: -- don't have as much of a spaghetti --

MR. HERTEL: -- so much more interconnected.

MR. HELME: -- you know, the transmissions are really obvious.

MR. HERTEL: Yeah, --

MR. HERTEL: It's no the spaghetti like it is in Pennsylvania --

MR. HERTEL: Yeah.

MR. HELME: -- and New York and so on.

MR. CAVANAGH: So then, just do we have a straightforward convention for assigning greenhouse gas emissions to out-of-state generation? What are you using, the western system average outside of California?

MR. HELME: I think that's what we've used. We basically follow Tellus' numbers --

MR. CAVANAGH: Okay.

MR. HELME: -- used.

MR. LAZARUS: Well, actually the numbers

that you've seen are a little bit more subtle because they look differentially at the Pacific southwest and the Pacific northwest, what California assumes is the mix from each region.

But I think I just want to second it, the movement here that if we're doing from the modeling here, to straighten out what your conventions are for what you count, and the source of an emission out of state will be very important so that the modeling accurate, like your point is extremely well taken.

The modeling has to reflect the kind of policy instruments that you have and the accounting techniques you're going to adopt. Although the modeling can move ahead of that, if you really want it to be in synch, you need to push that conversation.

MR. HELME: In the back.

MS. STERKEL: Where's the microphone? Thank you.

So, this is Molly. Ralph, I know you know that the reporting is standard statewide (inaudible) and the modeling issue is really fascinating, but I think what's really interesting about your point, Ralph, is that it's really a policy issue.

And since this is the advisory committee which is talking about policy, from a policy perspective you want to encourage policies that are both uniform across multiple states, (inaudible) Western Governors Association think is so important, but then also we don't want to encourage a policy in California that has a net benefit of reducing emissions elsewhere. And so therefore, oh, well, then we won't do it.

So, the importing RECs from -- renewable energy credits from other states to fulfill our RPS standard is a great example of how, you know, we could be reducing emissions in other states. And then saying, oh, well, since it doesn't really count in our state inventory then we won't do it.

So I just encourage everyone to keep that in mind in terms of the policy initiatives don't turn down a policy opportunity just because it might not fall within that first line.

And I think that's, Ralph, that's your point, is we have to be able to include the total to it all, not just the state total. Anyway, back to the policy.

DR. WAGGER: In the back row.

MS. WITTENBERG: Hi, Diane Wittenberg, California Registry.

COMMISSIONER BOYD: Diane, you're going to have to --

MR. HERTEL: Come up to a mike, Diane.

UNIDENTIFIED SPEAKER: Just come up to the table.

MS. WITTENBERG: Okay, just two points, I couldn't let it go. In terms of measuring the greenhouse gases from an accounting perspective, the PUC has asked the IOUs, the utilities, to -- and other municipal utilities, I think, are following suit, how many greenhouse gas emissions are there per megawatt hour delivered.

And so in response to that we're already starting conversations with the procurement departments of the instate utilities to require the same accounting procedures for greenhouse gas emissions delivered, which will somewhat address that.

The other thing we're trying to do, and, you know, I'm sort of presuming on some of my luncheon remarks that there is one thing I would like to see from this Advisory Committee from the very selfish prospective of the California

Registry, is to help encourage a western states registry.

Because the first piece, which is not necessarily the policy piece, but everything springs from there, is what is your baseline of greenhouse gases delivered. And then that helps you modulate where to get.

So I think we're trying to address both those questions, you know, somewhere in our vast state efforts.

MR. HELME: Any questions? Okay, should we break or should we go to cement? We're close to lunch; we could start on the cement presentation --

COMMISSIONER BOYD: Why don't you do the cement presentation.

MR. HELME: Okay. David.

MR. CAVANAGH: Actually, Ned, as you're preparing to do the cement, Diane, if I could just ask you when you give your luncheon remarks, this is Ralph, to let us know if we're interested in trying to look back at what out-of-state emissions were in 1990 and 2000, as we will be in looking forward, can these new accounting conventions be, in some way, backcast so that we could figure out what they imply in terms of emissions in the past, as well as emissions in the future. And how you would advise us to do that.

MS. WITTENBERG: Okay, Ralph.

(Laughter.)

(Pause.)

COMMISSIONER BOYD: While they're working to set up the presentation, let me get into some procedural issues here.

When we're done with this presentation we're going to break for lunch for an hour. The Advisory Committee, it's consultants and advisors will retire to a different room for lunch and a presentation from the Registry from Diane Wittenberg.

Unfortunately, the logistics of things and PUC rules about utilities means we can't have a public luncheon, per se, i.e., can't invite the audience to partake of lunch. So it's kind of an awkward situation, but that's the only way we can work our way around it.

So, the public's on its own for lunch for an hour, and we'll have an informal gathering and discussion, and then reconvene in an hour from the time we recess.

DR. WAGGER: I guess it's good-noon. My name is David Wagger; I'm with the Center for Clean Air Policy, and I'm here to present some preliminary work on reduction potentials in selected industries in California. I'm presenting the work of myself and my colleague, Matthew Ogonowski, who did work which will be later presented, on methane emissions or abatement from manure management in dairy farms.

(Pause.)

DR. WAGGER: Here's what I'm going to talk about today, at least before lunch I'm going to talk a little bit about cement production; and after lunch I'll talk about petroleum refining, dairy farms or manure management within dairy farms. Talk generically about policy options and issues in the industrial sector. And then conclude.

(Pause.)

DR. WAGGER: Thank you very much. For those of you who don't know what cement is, I'll try to give you a brief overview. This is a lot of information. I'm a technical person. Being in a policy forum I'm a little bit out of my element.

But essentially there are two major

steps to producing cement. First you take a whole lot of raw materials, about 1.7 pounds, kilograms, whatever unit per pound of or unit of clinker that you produce. And of that material, about three-quarters of it is limestone. The importance of that will be clear a little bit later.

The raw materials are converted to clinker which is done in a kiln at about 2700 degrees Fahrenheit; it's fairly hot.

As I said, a whole lot more raw material is used per output of clinker. The fuels that are used -- this is a U.S. average -- about 74 percent of the kiln energy is from coal; about 16 percent from petroleum coke; about 4 percent from natural gas; and a little bit less from tires.

I think for California it looks like a little bit less coal is used on a percentage basis, a little bit less petroleum coke, but about twice as much natural gas. That's what it appears on the preliminary evaluation of the data. And tires are about the same.

The importance of the limestone is that you get CO_2 from both the fuels you use to light, to heat the kiln -- or fire the kiln, as well as a decomposition of limestone into calcium oxide and

CO_2. And this is known in the greenhouse gas inventory as process CO_2 emissions from cement.

Once you have the clinker formed, you need to cool it. And then you will transport it over to your grinding equipment where you will grind about 95 percent and 5 percent gypsum to produce what is known as portland cement. There's also masonry cement which is a different type of cement, but it's a fairly minor portion of cement production in California.

And a one last sort of note is that the chemistry of clinker formation is very important. And this means that you just can't do anything, you can't throw anything into a cement kiln and expect to get quality cement.

For instance, you can't throw an infinite amount of tires into a cement kiln to substitute for coal because the iron in tires will make the cement very weak. And you wouldn't want that to build a bridge or a building or something like that of major importance.

MR. PARKHURST: David?

DR. WAGGER: Question? Yes.

MR. PARKHURST: Is hazardous waste not a component at all? Because I know there's a lot of hazardous waste incinerators that --

DR. WAGGER: Yes, it trailed off. We didn't have room, but there's smaller percentages going down. There is what is known as there's solid waste. Solid waste might include hazardous waste, because by definition of regulatory law, hazardous waste is a special condition of solid waste.

So whether at just municipal or hazardous waste, it could be something like used hydraulic oils; it could be something like spent alcohols in let's say pharmaceutical companies. I know a few cases where they send their spent isopropyl alcohol to a cement kiln.

And there -- and, yeah, so that's about the limit of the fuels that are used in a cement kiln.

Here's an overview of what it looks like in California. There are 11 cement facilities, three in the north and eight in the south. And there's 20 total kilns.

The difficulty in California is they all use the dry process, which is a lot less energy intensive than the wet process which is used elsewhere in the country. That's true for both the fuel used in the kiln, as well as the electricity you need to grind and convey the material.

An estimate that I made was about 4 million metric tons of CO_2 comes from fuel use. About 6 comes from calcination, that's consistent with the greenhouse gas inventory from 2002. I've estimated about 42 trillion Btus of energy consumed.

The two numbers for cement, for coal, petroleum coke, I actually managed to get those, sort of off the record, so to speak. So those are actual numbers used in California. 4.5 million tires is a number gotten from a report to, I think, the California Legislature about who is burning tires and what industries.

And for sort of completeness about 1700 gigawatt hours of electricity is consumed in cement and clinker. California, about 10 percent of that is self generated, which is about twice the national average for the cement industry.

And in terms of CO_2 emissions the fairly small number from electric grid, again it's an average grid number, which is something around 1000 pounds per megawatt hour, depending on which data you look at.

Okay, here's some key assumptions. You need to have baseline, so I used those from recent California data provided by the USGS. They're a little bit bumpy so there's some uncertainty in projecting it forward.

I needed to adjust the fuel consumption for California, for example, they tend to use more natural gas, a little bit more tires; and electricity, they self generate a little bit more, so that has an effect.

I assume that clinker and cement production are increasingly efficient out to 2005. And here is one of the important things that gets into the abatement curve is I basically assumed everything up front, which is essentially setting an outer limit as the maximum you can get. And if you phase it in over time you'll get less just because there's less time to get reductions.

So this likely maximizes CO2 reductions in your financial results. Also when I show you the abatement curve you just can't add up all the energy and CO2 reductions and say that's what you'll get. There's some overlap depending on what the technical penetration of different measures are in different parts of the cement sector.

Some overlap; some don't overlap. Some could be done, but you only can choose one of two. So that's a little bit of the uncertainty.

And then in terms of figuring out what the reductions in fuel consumption are, I assume it's taken from all fuel sources. I'm assuming that any electricity saved is reducing purchased electricity. And basically the financial benefits are only from lower operating costs.

I'm not talking about energy or fuel. And lower fuel and electricity costs, what I'm not including is perhaps the benefit of reducing say NOx emissions and there's a credit that you're not buying that's cash in your pocket. You're not paying it out to buy emissions credit. Or you can sell them. I'm not including that at all. And that could change the economics quite a bit.

And finally I think Stephen Schneider spoke about it earlier, conserving discounting -- we've assumed constant dollars discounted back 7 percent to 2005.

So here are the energy efficiency measures considered. I considered it for three different phases, raw material, kiln and finishing. There's general operations and product change using existing technologies, not emerging ones, whose technical feasibility and costs are just not known.

So I looked at four raw material measures, which essentially give you more efficient transport. What I mean is conveying, say, from one part of the plant to the other. Grinding and blending.

Kiln, essentially they reduce heat losses. There's greater heat recovery for reuse elsewhere, such as preheating material that goes into the kiln or power generation, say, by a steam turbine using waste heat.

And then fuel switching in the particular case of waste tires. Basically not using coal, using waste tires instead. Again, you can't do that to a great extent. I assumed 10 percent. That's probably a reasonable assumption.

Finishing is very similar to raw material, basically more efficient grinding and blending. General is basically preventative maintenance, process control all over the plant with efficient motors and drives.

And finally, this one is a bit tricky. Product change. Basically a reduction of clinker content of cement. That's called blended cement. And if I may try to give you an analogy, it's the cement equivalent of Hamburger Helper for hamburgers. Essentially they're using a different material to substitute for clinker that you don't need to heat, fire. So you're reducing your energy consumption per unit of cement produced.

And then there's another one which is known as CemStar. It is a patented, a licensed process. And basically you're improving clinker formation using steel slag in addition to all the other raw materials.

And with both of those there are associated criteria emissions reductions, for example NOx, and that gets into the economic benefits of using this, whether you can actually gain money in your pocket from reduced buying of credits or selling of credits into some sort of market.

Okay, here's some major data issues which are key to the analysis. Operating data for cement in California is not plentiful. And different sources of data are inconsistent.

The example I give up there is USGS estimates of electricity consumption versus CEC estimates of what the industry is consuming. They don't quite match. So that's a bit of uncertainty.

Down times required for implementing the measures are uncertain. If they do a major overhaul, say you want to put a giant piece of equipment in front of your kiln, you have to shut off the kiln for three months. How much of a financial loss is that. There are those kinds of issues.

There's also significant potential changes in the cement industry. As someone from USGS told me, the question is cement looks like it's going to go from sort of a chemistry standard, basically you have to fix the amount of certain materials you put in it, to something more along a performance standard which has nothing to do with what you put in it. As long as it's strong enough and has all the healing properties and drying properties and tensile and compressive strength properties, you don't care what's in it.

There are some exceptions. For example, you don't want something with heavy metals in water service. That's just asking for trouble. So, that could change the industry quite significantly.

The second one is the expiration of the license of CemStar. I'm guessing it's around 2014, just because the patent was given in 1994; 20 years. So the question is how will the industry react to that. Will they suddenly go for it, or are there issues in California that make it perhaps not a sure bet.

Finally, I didn't consider emergence of advanced technologies, because I'm not sure what they might be, but who knows by the years.

And finally the future fuel and electricity prices are uncertain. That would change your future benefits from reduced electricity and fuel consumption.

So, here is my best attempts to essentially figure out how much cement is going to be produced. These numbers over here just show you essentially the change from initial and absolute numbers and their relative percent increase. These are projected from actual data; I haven't assumed anything about markets or what their plans are for construction. It's just a straightforward extrapolation.

Looking at baseline fuel consumption, looks like it's going up about 44 percent. If you look over here in the squares, coal is increasing somewhat. And then this one last, this triangle down here, petroleum, coke, they're both increasing. And those are kind of the major energy contributors to cement -- clinker and cement in California.

Okay, this is about electricity consumptions indirect. These are not emissions that occurred inside cement, but there is somewhat of a relationship between the electric grid and cement.

What you're seeing is you're looking at the total consumed by industry, the increase over time. This is the total purchased, and then you have essentially what is being self generated down here. It's increasing slowly.

And then these are actually overlapping. That's the raw and the finishing are identical, almost, to many of the kiln electricity, which is basically for blowers and fans and things to get your cement kiln rolling. Because it's a rotating kiln. And other electricity needs for that.

Here is a projection of what I call direct CO_2 emissions. It includes both fuel and calcination. The top line up here is the total of both. And I give numbers in 2010 and 2020, annual number is about 12; about seven is from calcination, about four is from fuel. In 2020 it grows to a total of 14, nine from calcination, five from fuel. And these are the cumulative numbers in case you wanted to say what's the total reduction from the baseline. You divide it by the total baseline output; you get a relative percent reduction possible.

This is essentially comparing combined direct and indirect, and breaking it down by direct and indirect. So this top line is both. You see that essentially direct is a majority of the emissions. And then there's a little bit from purchased electricity. Again, it's average grid electricity, according to the Energy Outlook 2005. If you do the numbers it's roughly 1000 pounds per megawatt hour. It doesn't vary a whole lot from that. It goes down below it, and then rises later.

Here's where you get a little bit into the interesting part. This is an abatement curve for direct cumulative CO_2 emissions. Discount at 7 percent, as I mentioned. The baseline for this is essentially 274 million metric tons emitted during this period.

What I've done is I've put all the measures down, and essentially what you're seeing is you look at how much the cheapest measure can give you, and then you look at the next one. You build a curve like this.

What we have here is these are the measures that basically have a net cost savings. And it gets you about 6 million metric tons cumulative, and it's 6 over 274, so it's a little over 2 percent. Again, this is sort of a maximum number.

I have this particular option in question mark because I'm not sure that this actually applies to the kilns in California. I don't know the exact configurations, but I'm not sure there are any preheater kilns without a precalciner. I know that's a bit vague, but there's a question about how much this can be implemented in actuality.

You see the big contribution could be from blended cement. And I have that in a dash line because there's some uncertainties I'll get into about whether you can achieve all this or not, as well as CemStar. So this is about 30; this is about 7. And it gets you to 43 total reduction. Again, against 274. And then the curve starts climbing.

Again, these are for direct. This is basically about fuel into the kiln. Many of the measures I talked about actually are only electricity. Basically motors is only electricity. It's not fuel. So some of the measures are indirect. It's not inside the cement industry's sort of basket of emissions.

MR. HELME: There's 43 cumulative, which is about 2 million tons per year --

DR. WAGGER: You could divide, that's correct, that's correct.

Oh, no, no, your question, yes. What I attempted to do in coming up with the numbers is I look at the capital cost for doing it at the penetration rate given the amount of capacity that exists in 2005.

For certain measures I had to assume, just on a plausibility argument, that they're going to have to shut down the kiln. And that's actually an opportunity cost. There's a question about what the value of that opportunity cost is.

If you can sell, let's say, clinker -- or excuse me, cement, at $75 a ton, is the value $40 a ton that you're losing by not operating. I tried to add that in for some of the larger measures that I have up there, which I think are these, these, this one and that one and that one.

And then try to figure out what the fuel and electricity -- or the fuel savings, in this case, would be. And then figure out what the net benefit or costs might be. Again, discounted back to 2005 at 7 percent.

I actually omitted one category and I'll tell you a bit about that after I go through this. This is a summary of the measure of how much cumulative CO2 emissions you can reduce, as well as indirect. And then a payback period, if there is one, for general measures, it's things like process control, preventative maintenance. You get up to about 1.6 million metric tons.

That's cumulative. You divide by 20 to get an annual number. Indirect you save a bit and the payback is pretty quick, four years.

Finishing, you don't save a lot, and the payback is reasonable. Kiln is about the same as general. You save not so much indirect, and the payback period varies from one to 14 years depending on which measure you're talking about.

Product change I have in italics because again it's a little bit difficult to calculate. you need to calculate actually what's the benefit, what's the value of clinkers you're not using in cement. And that's a real controversial thing to calculate. You can save anywhere from 7 to about 30 million metric tons cumulative between the two measures.

Interestingly, for both measures there's a penalty in indirect. And it's not merely electricity. For example, if you're trying to do blended cement and you can't find enough fly ash in California that's close by, you've got to import it from somewhere. So there's a cost to acquiring the fly ash.

Fly ash isn't like tires. Fly ash actually has an economic value which actually can be very large, depending on what the application is. So it's not something free that someone's going to pay you to take, like tires. It's actually an expense.

And you have to transport it perhaps several hundred miles, depending on where you are and where the nearest source is. Given the demand for fly ash in building roads and other things, it's not a cinch that you're going to be able to acquire what you need.

The same is true of steel slag. It's not clear that you're going to be able to get enough for your needs in California, and you have to get it from somewhere else. And that, too, is a commodity. It's not a waste that someone's going to pay you to take.

Did I see a question? Okay. So, it's --

MR. OLSON: Is that an --

DR. WAGGER: I'm sorry?

MR. OLSON: Is that an after-tax table?

DR. WAGGER: Oh, I didn't do that. I don't know incremental marginal rates and things like that. That's a good question; I didn't calculate that.

And the last one here, I think some of you here can't see because of the podium, it's waste tires. The thing about waste tires, it's actually a kiln measure, is that the amount of CO2 per Btu is actually higher than coal. And what happens is if you substitute one for one, you actually get more CO_2 emissions coming out of the kiln.

Now, that's important, coming out of the kiln. If you're going to burn them over there off the property anyway, it's just going to get CO_2 anyway, in an aggregate sense there's no harm done. But from the cement industry, if they're going to be charged for the CO_2 they emit, they're importing CO_2 in with these tires. And there might be a policy issue about whether you exempt the carbon from waste tires because of sort of the net benefit from around the whole state, so to speak.

The one I didn't -- I inadvertently left off as a result of an editing change, was raw material measures. They actually reduce very little, less than 1 million metric ton cumulative. And their costs are generally very high, which is essentially -- it essentially was over here. Actually, I'm sorry, I think I skipped one. It was over here.

I think I inadvertently skipped this one. This basically is direct and indirect, and the curve is a little bit different, but the story is the same. You're getting not more than 50; 44 is where it starts getting more expensive.

So here's some conclusions. Cumulative reductions are likely to exceed 50 million metric tons cumulatively out of 274. So that's sort of an upper bound on what you can get.

Reductions of 6 million metric tons of direct is possible; a net savings of about a little over 2 percent, getting to the issue of a significant figure that Mike talked about. Is it 2.3, is it 1.9.

Blended cement and CemStar can get you up to 30 in 7 in maximum cumulative emissions, and their costs are roughly 4 in 13. But their feasibility and overall costs are uncertain, particularly concerning emission credits. And also the costs and benefits of not using clinker and acquiring raw materials such as coal, ash and steel slag.

And it's unlikely that more expensive measures are going to give you a lot more CO_2 reductions, at least with current technology.

Here's some implementation issues. I alluded to them a little bit earlier. Large capital costs about down time. If you look at roller mills, and again these turned out not to be particularly cost effective. If you (inaudible) them everywhere you've got almost $100 million of capital equipment expenditures. So there are some, let's say upfront hurdles to overcome.

For those with downtimes, and downtime opportunity costs, for example this measure, you've got 80 million in capital costs. And if you shut down for half a year and you've got 47 million -- that's a number that's a little bit soft -- in opportunity costs lost, basically you're not making material and you're not getting a profit out of it.

Waste tires is an interesting one. About half the plants that are permitted to burning, there seems to be a lot of public opposition. And you'll likely get more CO_2 emissions from the kilns, themselves, again, not looking at the larger picture.

Blended cement and CemStar have the same problems. Is there sufficient slag or fly ash to actually make them work at their full potential. Most current cement standards for the case of blended cement go to performance cement much sooner, allowing this to actually be implemented rather quickly.

And for this one, if the patent expires, which actually is a significant cost, will companies start to use it because they're not paying for a license.

So, potential next steps for cement. We need to consult the industry for better data and projections on actual California operations, especially with regard to the energy efficiency measures that are actually feasible in California cement plants.

Find better data on fuel consumption and electricity consumption by cement plants. Again, those were a little bit extrapolated from the U.S. data, as appropriate.

Evaluate different scenarios of phasing in implementations; not have it all upfront, but say 10 percent of potential, or 25 percent of potential in the first year; 25 percent more in the second or third year, et cetera.

And finally, assess the impact of future electricity and fuel prices on the implementation of the measures and their abatement costs and reduction benefits.

And that concludes very hastily the cement analysis. I'd be happy to entertain any questions.

I have a question.

DR. WAGGER: Sure.

MR. OLSON: I have a question. It's hard to -- this is Tim Olson, California Energy Commission -- it looks like you have some self generation there. Is there any opportunity for combined heat and power? And so maybe the question is is there a thermal demand for cement that then might stimulate an opportunity for combined heat and power onsite?

DR. WAGGER: As a stand-alone, no. Because as far as I'm aware cement doesn't use steam. If they were next to some facility that did have a steam need, and they could perhaps have a joint venture or go with some other company to build one, the electricity would go to the cement plant and the steam would go to whatever the other industry might be. That might be an option.

But, unless they have a clear buyer for steam, it's not an obvious thing to do.

There was one plant in 2001 that de-mothballed an old coal-fired plant that was built in the '80s. And they fired it up for nine months in 2001, actually, they told me. And then they shut it down because the utility basically undercut their costs. They said we will give you this electricity at so much of a price. And basically it became uneconomic to run their own coal plant.

So as far as I know the only self generation is from waste heat that is converted to steam and then run through a steam turbine, as far as I know.

MR. BEEBE: This assumes that cement is used as cement and there will be no changes. But if you had product substitution, for instance bitumen for road surfaces versus concrete, or steel or carbon used in building structures rather than concrete, what does that do? Have you done any sensitivity studies?

DR. WAGGER: No. Econometrics, that kind of analysis is not my strong suit. It was hard to say -- let's say that standards for cement do change, whereas performance, you can use anything in lieu of cement, no matter what it is, as long as it meets certain requirements.

That could do a lot of damage to the

industry to the extent that it undercuts their consumption. It could be that, and I'm not saying this will happen, but it could be that production will just drop off because they don't have to make as much, which would reduce emissions.

But it's hard to say with any certainty how they'll respond to those types of -- will they export to China. Maybe China can't produce as much, so what they're going to do is China basically has more demand than supply, so maybe they'll ship it off to China.

I have no idea. So it's hard to say what will happen in that scenario.

MR. HELME: One additional point on that, though, I know the cement industry nationally has argued that substitution of cement for asphalt is a winner from the CO2 perspective. So -- negotiations about a voluntary agreement with the administration, they've argued the merits, but there's a significant difference in CO2 emissions with the substitution o cement for asphalt (inaudible). I don't know if that's true, but that's the argument.

DR. WAGGER: Yeah, you don't have to look to the petroleum refinery and look at the cement side by side to figure out, is it one for one for asphalt, is it two for one, is it one for two, and do that. Probably pretty complicated depending on what you're building, a major highway or a country road out there where you've got, you know, three cars per hour pass on the road. And you don't need a real strong road.

And so there's a lot of uncertainty to that.

MR. MARK: I was just hoping you could clarify some of the --

DR. WAGGER: Sure.

MR. MARK: -- just put things in perspective. If I'm getting your numbers right, then the fuel plus -- essentially process emissions is about 10 million metric tons of CO2 a year is --

DR. WAGGER: It will get that. Right now inventory says about 5. That's a default number, meaning they assume something generic about calcination and they figured out 5.5 in 1999. That's about the right number, but going forward it looks like it's going to increase just because they're producing more clinker.

So, yes, --

MR. MARK: So roughly around 10 for today. It seems like we're at somewhere between 2 and 2.5 percent of California's emissions. Is that --

DR. WAGGER: When you say California's emissions, are you talking about industrial emissions or are you talking about total --

MR. MARK: The entire state's greenhouse gas inventory, including imported electricity.

DR. WAGGER: Yeah, basically if you take a look at --

(Parties speaking simultaneously.)

DR. WAGGER: Let's see, if you take a look -- take 2005, you've got 35 total, so let's say 35 over 400, roughly 400. So you're something under 10 percent if that's what you mean.

UNIDENTIFIED SPEAKER: That's refining.

DR. WAGGER: Oh, I'm sorry, I'm sorry, I went too far.

MR. HELME: It's 11 out of 400. Annually it's 11 out of 400.

DR. WAGGER: Yeah, right there, yeah.

MR. MARK: And just sort of make the additional point that you're talking about potential range of reductions in that 11 million tons of 2 -- if i get the numbers right -- roughly 20 percent is sort of you -- you said, you know, 50 cumulatively --

DR. WAGGER: Right, 50 over 274 roughly is roughly 20 percent. Again, the curve goes very steep there; doesn't look like you can do better than that. So that's right.

MR. MARK: So just to wrap it all together then, if I've got this right, the types of reductions we're analyzing here are somewhere south of a half a percent of the state's total greenhouse gas emissions.

DR. WAGGER: The reductions you're saying?

MR. MARK: Yeah, the potentials for reductions.

DR. WAGGER: Let's see, you've got -- it can be smaller than that. If the total is, if it's let's say 11 out of 274, and then you basically take essentially one-fifth of that, you get whatever number you get, so.

MR. MARK: Okay, thanks.

MR. LAZARUS: -- thanks for the presentation; again, a better picture of the production side of the cement industry.

What I've heard a lot of talk about is the consumption side of the cement industry, which is architects and building owners, and the self sustainable, you know, green buildings and trying to use blended cement. And the issue being there one of barriers.

And I know Mike Burnett back there from Climate Trust, you have in your portfolio, if I'm not mistaken, a cement project which involves working with building owners and other construction crews to get them to use blended cement?

MR. BURNETT: Yeah, it works kind of vertically throughout the industry.

MR. LAZARUS: Right, I think the barriers are that you've got a product that takes longer to set, but it's stronger in the end? Is that correct? Blended cement.

MR. BURNETT: I think depending what you add to it, that could be true. You can add fly ash against steel slag, there are lots of different things you can add to it, it might vary. But I think I have heard that, but I didn't look at that in any depth.

MR. LAZARUS: So I guess, you know, it

would be interesting to see what the issues are in terms of getting this product, because it's sort of a different product, penetrated into the California market; this receptivity and what the barriers are with respect the California industry, itself.

DR. WAGGER: Well, that's true. As well there are essentially composition requirements for cement. There's type 1 through 5, and there's subtypes. And they're fairly closely regulated.

But if you go to performance, again, those will all disappear. Basically it's strong enough and it doesn't, let's say, release heavy metals in, let's say, sewer applications, what-have-you, drinking water, that kind of thing, you can use it. In theory that's what would happen if you go to performance.

And then how will the industry respond. Will they cut down clinker and try to buy up all the fly ash and steel slag, you know, to produce blended cement. I don't know how the industry will respond.

Especially in California if there's going to be a great demand for it, and you have to import it for a long distance into the state.

There are extra emissions with the transport, which I tried to incorporate into the indirect emissions from cement.

MS. TUTT: I don't think there's a lot of cement transport because it's heavy and -- not cheap, you know, so it tends to be local. And so it stays.

And I just would say the cement industry worldwide has been a leader in how to calculate in getting a world standard on what its GHG emissions are, which kind of tells me that they have some plans to reduce.

And so I don't think it's going to be quite as big of a hurdle as you're saying it might be. I think they kind of see all of these aspects of GHG reduction as something they can do. And they're starting to do that now in Europe now that the European trading system is in place.

And also, at least in California, almost every cement company, which is dotted up and down the desert, north and south, is owned by a European or foreign company that's under Kyoto someplace else, which does tend to drive the trends.

So I think it's really a waiting game

for cement. It's really not a technology game. Just from my conversations.

DR. WAGGER: Well, I think that's right. Again, for a blended cement in the CemStart sense of changing the product there are some issues which are not technological related to costs of licenses, as well as the availability of material to actually make the blended cement. That's a little bit unclear for California in particular.

But what you say is true. Again, California is fairly efficient compared to the national average, which makes it a little bit more difficult to make productions in a fairly efficient cement sector in the state.

MS. YOUNG: Yeah, I'd also just like to mention for people's information that over a year ago, maybe two years ago, the City of Berkeley was the first city, anyway, in the country to adopt a climate-friendly cement ordinance. So the City of Berkeley is purchasing now only climate-friendly cement, which I think is interesting.

DR. WAGGER: Out of curiosity, is there a particular standard of what that means?

MS. YOUNG: I'm sure there is.

(Laughter.)

MS. SKINNER: It's a blended cement, and I wanted to speak to that because the issue is even though most of the cement companies in California are owned, are European companies like LaFarge, and LaFarge is very very good on issues like this, there is still a very serious barrier. And the barrier is in the engineering specs.

So that whoever is purchasing the cement in a way under most of the standards by governments, by California, by local governments, by contractors, requires them to not use the blended cement.

So until those specs are changed, which is what the City of Berkeley did, you're not going to even -- if the industry helps to get the specs changed, that would be good. But unless those forces come together, then that kind of reduction is not going to --

DR. WAGGER: That's absolutely right. Again, that goes to the issue of performance versus sort of the composition standards.

COMMISSIONER BOYD: Okay, I think we need to terminate this, or it'll be a very long day.

PG&E has made a modification in the

luncheon directive. We're going to declare about a 15-minute recess and the public can go out and grab some lunch if they want. The Advisory Committee and consultants and what-have-you will grab the lunch that's been provided, and we're going to reconvene in this room.

So any members of the public here can, if they want, listen to the luncheon speaker. And others can go out and grab some lunch. It's awkward, I'm sorry, but the best way we could figure our way out of this and facilitate the maximum public participation. So.

(Parties speaking simultaneously.)

UNIDENTIFIED SPEAKER: So lunch upstairs. Yes, lunch --

(Parties speaking simultaneously.)

COMMISSIONER BOYD: The Advisory Committee members and their folks, we go upstairs and grab some lunch and bring it back down.

(Whereupon, at 12:52 p.m., the morning session of the public meeting was adjourned, to reconvene at 1:15 p.m., this same day.)

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LUNCHEON PRESENTATION

1:20 p.m.

MS. WITTENBERG: I was invited to speak as a counterpoint, not in terms of content to what went on earlier today, but the idea was a more informal conversation because you all have been barraged with many facts and figures.

And so I have -- I felt we might have a little bit more of a conversation and hopefully, although I don't know what he's going to say, it would be a prelude to Ned Helme's conversation after lunch.

So, it's the beginning of the framework talk, I think, about policy options that this Committee might be considering.

First let me tell you a little bit about the Registry. I'll be very brief since many of you are members of the Registry, which I very much appreciate. But to recap, we're a voluntary registry created by the State of California essentially to protect and encourage early reductions in greenhouse gases.

And what's come out of that is that in order for the State of California to stand behind any data in the Registry, and they have not committed to what extent or how much they'd stand behind it, but it's the general intent of the Registry, we work with the CEC to set accounting standards for the GHG emissions. And that has really emerged as one of the biggest efforts that the Registry has undertaken.

And we started with the World Resources Institute, World Council of Sustainable Business Development, kind of generally accepted global GHG accounting standards, and kind of operationalized those. and made an accounting protocol that you could actually sit down, and by the end of going through it you could actually calculate your GHG emissions based on the WRI standards.

And then also a piece of software that works with that. And then also a certification protocol. Together with the CEC we qualified third-party certifiers and then trained them on our own protocols. And they go in and certify all those who report to the Registry.

So it's a rigorous accounting standard that we have evolved with much stakeholder influence. And so it has some legs. Because a registry is essentially a conservative kind of organization. You have to have buy-in that these are the right standards for people to use them.

Our biggest sector is the electric power sector. I think you saw one of the reasons why in the numbers that essentially electricity and transportation are the two biggest emitters of greenhouse gases as sectors.

We've continued to work to refine and add to our accounting protocols by industry. We're working with the cement sector right now to refine and look at their accounting protocols and see if they're acceptable for the California Registry. We don't want to reinvent anything, but the CEC is kind of our filter in saying well, are these self-serving or are these straightforward, good accounting protocols.

And like any accounting protocol, within a range there's several right answers. The goal for accounting protocols is that you have consistency and transparency and comparability. And so therefore everybody has to do it the same.

So it's just like financial accounting is what we're really all about and trying to work for.

And another thing that the Registry does is work to harmonize what we do with international standards. Because generally accepted wisdom, I think, in this room and other places is that there will be cap and trade programs, perhaps in the state, regionally, nationally, internationally.

And it's really key as the infrastructure for a cap and trade system -- and it was mentioned here earlier -- that the reduction tons are, first of all, real. And you can trust that it's a real reduction. And second of all, fungible. And, you know, you might have a real reduction, but if you don't measure it in the same way, you're going to have discounted tons across regimes, and it just gets messier and sloppier and it doesn't go to the real goal that we all have, which is real reductions that we can measure and know where it's going.

I did want to make one comment as I listened to the conversation this morning, and that is not knowing everything you talked about before or where you're going, but it seems to me there's a giant hole in terms of looking at the role of sequestration.

I mean I think the number is that 700 tons of carbon are sequestered per year in a redwood forest, in a true redwood forest. And I realize that's a sink. But if you reforested more redwoods, or I think maybe the number is closer to 300 tons an acre for mixed conifers, there is a real opportunity to conserve or to sequester carbon.

Also Peggy Duxbury from Calpine and I were talking earlier, the State of California is part of (inaudible) led by the CEC, which is looking at geologic sequestration in the state. And I think those are a lot bigger numbers than some of the other actual sources we're talking about.

So, I just wanted to, you know, raise that flag, and I guess maybe you're going that way later today.

Let me tell you something we've learned since we've started the Registry; two kind of recent lessons learned that we've been thinking about.

One is that voluntary programs really have their limitations. The Registry was started by a state law because certain companies came to the state -- this was well before I was on the scene -- and said, we'd like to make some early reductions, we want to protect those. And we also want to show that companies are good corporate citizens. We see this as an international emerging problem, an enormous environmental issue, and we want to show you that, you know, we don't all have to be regulated. That we can be good upstanding citizens and address an issue on our own.

And those were part of the motivations for starting the Registry. And, in fact, companies join the Registry at a very slow rate. I would say we maybe have 45 organizations. And many of them are big emitters, mining and oil and gas and electricity and manufacturing. And many of them are key environmental organizations like NRDC and UCS and Environmental Defense. And state agencies like the CEC and the PUC and Cal-EPA and some of the universities.

So we have a very wide base, but I keep waiting for that ball to roll faster, and it really doesn't. And so I came out of a business background and I'm more cynical than I thought I would be about voluntary action.

The second thing that we're learning is how valuable third-party certification is to our members. Many of our members got a couple years of inventory under their belt because most businesses are like people, you don't like to expose yourself to ridicule or the fact that you've done something wrong. So they tend not to go for certification and have two years before companies have to go for certification. They tend not to do that until they think they're pretty bulletproof. That they have really scrubbed their numbers and they have very certifiable information.

And most of them do have certifiable information but they've come to us and they've said, you know, we really learned a lot having to certify. We missed sources that we were very surprised about. We calculated certain process emissions to be de minimis and are certifier made us calculate those to make sure that they were de minimis, and we learned some things about our process emission. And just generally we have a much better handle on our GHG inventory.

And that's what's helping us in two ways. One, we can assess these policy options as they come forward and really know how they're going to affect us as opposed to saying, what are our GHG emissions. I mean, how will this affect us.

And secondly, we really can see the low-hanging fruit, and we know where we really have emissions and thus can really address specifically how to reduce them. And that's the next step for the Registry, is we work with now our companies that are just getting certified, the first 20 or so are certified, and talk about, well, now what reduction strategies shall we apply.

So that's where we are. Ralph asked about the backcasting of emissions calculations. By law we can register emissions back to 1990. But the key to that is you have to have the data. And that's the real hard part is actually having that data so you can do that.

So the most we've had anybody talk seriously about is registering maybe back to 2000. I don't think anybody feels that they have the data to go beyond that. And many companies can't go back that far because they just didn't collect the data in a way that's certifiable, or at all in many cases.

So that's about the Registry. Where do we go from here. One issue I wanted to talk to you about and really to get some feedback on is the issue of entity-wide reporting of GHG emissions.

That's what the California Registry does. It requires entity-wide reporting. If you look at the one cap and trade program that is being worked on the most right now, which is called the RGGI program in the ten northeast states, and it's a cap and trade program that they're writing the rule for an electricity sector cap and trade, they are only interested in a registry to register facility emissions. Because they say that's how we regulate things, by facility. We don't regulate by entity by and large.

And so we don't see the value, really, of entity-wide reporting. I mean it sounds nice and I suppose it's okay for voluntary, but we kind of are more comfortable with facilities. And, you know, we can sort of regulate those better.

And so there's a conversation on the value of entity-wide reporting that I'd be interested in the expertise in this group adding to. I mean in one sense carbon is much more ubiquitous and so there's many more upstream and downstream emissions to look at than if you're just talking about something out of a smokestack.

On the other hand, out of a smokestack or a tailpipe is the main part of the emissions.

We think that entity-wide one of the things that we've been able to do at the Registry is get at some of these issues of ownership, which one is double-counting, or at least we're trying to go down that path. Boundaries; leakage. I mean, one thing, Mike, to your point about leakage, with the RGGI program only looking at regulating under this cap and trade program facilities in the RGGI states, and they're all right next to Pennsylvania, which is this giant coal state that is not necessarily going to join this RGGI program, I mean that's where their leakage issue really comes in.

While the California PUC, when it looks at these issues, and I'm not saying it's suggesting a cap and trade, but I think -- and I hate speaking for people who are actually in the room, but, you know, they're looking at if there were a cap it would be on kilowatt hours delivered. Because then you would at least, if not solve the leakage problem, you'd go a long way down that path. It would be closer than just the facilities, because you'd be at least attempting to get the out-of-state emissions.

And so those are the kinds of things we're talking about. Also, many of these companies now are starting to talk about changing their definition -- the often reported kWh per unit or product delivered. And there are some companies who are wondering if they should change that in the out-years, some oil companies, I think, who are talking about CO_2 per unit delivered.

And so that's a very big change. I don't know if it's going to happen. I don't even necessarily know that it's good. I don't know what the difference it will make. But it's a part of the conversation that we have with our members as they look at what's most important and effective in terms of reporting metrics to their customers and their shareholders.

And just finishing up on this entity-wide reporting, we felt it was important to put together a western states registry, partly because of this GHG, Western Governors with Oregon and Washington; but also because we're a grid in the western states.

And when we talked to Oregon and Washington they've said, well, yeah, maybe, but really we think we should only regulate entities, because that's where the emissions are and we're regulators and we kind of like to see that stuff coming out of the smoke stack and regulate that.

So I thought, I think I've heard this before. And I'm just about to have some conversations with Arizona, New Mexico and get their thoughts on this.

So it's made me think, gee, are we on the right track here, or the wrong track; or is this a little appendix that we register entity-wide emissions, which is really the World Resources Institute standard. And that people are going to change that and fall back to facility. Or is there a value in entity. And that's really kind of one of the questions I want to pose for you.

Just to pin it, the other areas that we're working in is with CalPERS and CalSTRS. They have a green wave initiative and corporate governance is part of it. And so from a shareholder perspective, many of these pension funds, as you know, are looking at greenhouse gas emissions.

And they're looking at it from a long-term risk issue. I mean they say we represent retirees who care about what a company's value is in 30 years when they retire. Or in my case, last year when I retired.

And we cant get our arms around, you know, sort of legal risk. We get nervous when we heard this analogy to tobacco, you know. We can't get our hands around legal risk; we can't get our hands around regulatory risk; we can't get our arms around the people who raised this issue of discontinuous change.

And you have oil and gas companies who are very concerned about greenhouse gas emissions and reducing them. And oil and gas companies who say, you know, greenhouse gas emissions, I don't think so, what are you talking about here.

So is that going to make a big difference in terms of competitive position. That's what some of these shareholder investment committees are asking. And so we're working with them on an initiative to help measure consistently across a sector so they can make these comparisons, their financial analysts could make comparisons and have data.

Because if you talk to financial analysts they say we like numbers, not verbal plans. So that's one of the things that kind of addresses the entity/facility issue somewhat.

On the other hand, if you're a big emitter, it's mostly coming from facilities. There might be a lot of sources. The problem is there's a lot of sources within a facility.

If you look at oil and gas, if you take a refinery, I mean how many sources would you say, Denise, are in one refinery?

MS. MICHELSON: Hundreds.

MS. WITTENBERG: Hundreds --

MS. MICHELSON: If not thousands.

MS. WITTENBERG: So, you know, that sort of argues for looking at, or maybe that's a facility is all the sources. But then it doesn't really matter what their electricity usage is, as an oil and gas company really. Usually that falls in de minimis in a big emitter.

So these are some of the issues that we're thinking about: western states registry; looking at the way RGGI is looking at cap and trade; looking at ways California -- there's many people in California talking about cap and trade. You're certainly one audience for that.

And the issue of competitiveness. Will people, in the long run, care about how much CO2 it took to produce a unit of product. And would we be putting our companies in a more competitive position by being on the front end of that, or would we be hurting our companies. And again, our, I mean talking as the state or the region or the nation.

And so those are the thoughts I wanted to throw out as sort of lunchtime conversation, and to get some feedback on.

MS. PULLING: Diane, one observation working with your group, which is a great group of folks, is that we have so many forums now in California, including this one, the PUC, the Registry, et cetera, et cetera, where these important issues are coming up.

And I'm just wondering if you could talk a little bit about some of the ways that the Registry is coordinating with some of the other agencies, and where you might see opportunity for more coordination so that there's a, you know, across state agencies we can get consistent approaches.

MS. WITTENBERG: Well, I would say that we don't do a lot of coordinating in the sense of leading and trying to gather the thinking together, because we're not a state agency. And so we can't presume to take that role.

So I would say our role with the state agencies, who variously look at this issue, are, you know, we also serve who only stand and measure, I mean. So I would say we don't take that role, and it wouldn't be appropriate to take that role.

And our harmonization efforts tend to be more with other organizations who look at accounting, with the members who are looking at accounting in various work groups. And we're looking at international -- forming up a new international standards board, so to speak, to look at these particular, you know, just like there's a financial accounting standards board, we think there should be a carbon accounting standards board. But what should that look like and who should be running it and what does it mean.

Those are the kinds of issues we

coordinate on. But in terms of the larger political issues, it's really not our role, I would say.

Peggy.

MS. DUXBURY: Diane, good presentation. And I agree with Wendy, it's been a good experience for Calpine being part of the Registry. We're almost done with getting our third-party evaluation on our inventory and there have been some lessons learned that we sort of thought we knew all this, because power companies have to report anyway to EPA a lot of our CO2 emissions. But it was a good exercise for us.

You raised the question about perhaps reporting on an output base, sort of pounds per unit produced. So in our case it would be on megawatt hours. If you were -- we've been kind of working in Colorado with a company that produces beer, and theirs is like per keg of beer, which to me seems like a lot more fun than megawatt hours.

(Laughter.)

MS. DUXBURY: And I think that's a really -- historic emissions is a useful thing to see, but in an economy like California's, which is so dynamic. I mean, Calpine didn't exist, we didn't have any emissions in 1990.

So looking at a baseline of historic emissions don't always make sense. Silicon Valley, so many companies that exist today that are powerhouses didn't exist in 1990. And I think it's a much more meaningful metric to see where the state is progressing if you look at measuring on this sort of output or performance basis. Because that's really the true sense of are you making progress or are you not.

The historic measurement really just shows, you know, who were the incumbents that were large generators at one point in time, at one snapshot in time, and I don't know how informative that is.

And if you do it sort of output-based you reward efficiency, you reward renewables, or non-emitting sources of CO2 and you allow that to be captured. So I think that's great that you're looking at it.

And I think as we look at policies and the cap and trade program we ought to also consider looking in that matter as a metric to consider.

MS. WITTENBERG: Well, I think it's

important to look at both. I mean in the end you need absolute reductions. I mean that's the problem with the metric, so you can measure progress in a metric, but in the end you need absolute answers.

MS. DUXBURY: You may need absolute economy-wide, but it may not make sense to require absolute reductions on a company-by-company basis. If you have a very fast-growing company that is producing growth net, absolute growth in CO2 emissions, but in terms of where they benchmark throughout the economy, they're much much lower, you don't necessarily want to discourage that particular company from growing.

So I think that's the challenge that you have to face in how you measure, and particularly as you try to start your cap and trade program.

MS. WITTENBERG: And also it's been raised that on a policy basis if you knew a metric within an industry sector you could focus on the bottom third of that performance in terms of efficient, so you don't have to focus on the entire sector, or maybe in addition to focusing on the entire sector you sort of look at the worst performers and see if you can make it a little better. So. Ralph.

MR. CAVANAGH: Just two quick comments. One, on the question of the metrics, it strikes me, since you have the relatively progressive climate entities coming up and the relatively reactionary, if there is such a thing, climate entities staying out, and that's going to really, I think, make it tricky to figure out how to showcase your guys, since you don't have the data on the bad guys.

And if your guys are the only ones who are reporting how much carbon per unit of output, for them the issue is flagged, for their competitors it isn't. That looks tricky.

I think the point it seems to me if the Registry wants to help equip its clients to anticipate and deal effectively and efficiently with a world in which there is a cap and trade on carbon, and so it's not about making companies cut back. It's about helping companies anticipate a market-based environment for greenhouse gas emissions and get ready for it.

And that will have, I think, different implications depending on where you are. It's obvious in the RGGI context all they can do, since utilities are out of the resource acquisition business in the northeast, the only way to create any kind of a market-based regime on climate is to go right to the generators.

There couldn't be more difference between the northeast and the west on this. In the west Hertel is responsible for resource acquisition. Now he will point out to me that there is some potential leakage around his resource acquisition. And we got to deal with that.

MR. HERTEL: There's some potential leakage around my resource acquisition.

(Laughter.)

MR. CAVANAGH: In the sense that there is not complete certainty about what his customer base is. And if, for example, you were to set up a carbon cap for Southern California Edison's resource acquisition and you didn't deal with the possibility of customers breaking away from Edison to go to another provider who wasn't under any kind of carbon constraint, you'd have a problem.

But in principle, and, Michael, I think this is the beginning of a discussion it looked like you wanted to have, so I simply invited. It seems to me --

(Laughter.)

MR. CAVANAGH: -- in principle in the west --

MR. HERTEL: Far be it from me to presume.

(Laughter.)

MR. CAVANAGH: -- in the west it makes more sense if one is going to have a policy that tries to reduce carbon emissions from the power sector, rather than California try to set up a westwide trading system among power plants, which it can't do, it would make more sense for California to try to encourage the load-serving entities operating within California to, in some way, limit the carbon intensity of their resource portfolios.

If for no other reason than to limit exposure to financial risks associated with future regulation of the emissions from those portfolios.

And so I think that is why you are at least seeing the beginning stages, as you look at what the PUC is doing, of more of an emphasis on the portfolio in California -- and by the way, this is also true in Washington and Oregon -- and less of an effort to try to do what's being done in the northeast just because so many of the emitters are simply outside the control areas and the regulatory jurisdiction of the California authorities.

In principle, that seems to me to be a reasonable distinction. There are critical issues to be resolved in the details to make sure you aren't just moving carbon around, as opposed to reducing it.

And I know that Michael, with his great penchant for skeptical questions, will help us find a way forward on that.

UNIDENTIFIED SPEAKER: -- patient with you, Ralph.

(Laughter.)

MR. CAVANAGH: As he has been for a quarter century.

UNIDENTIFIED SPEAKER: Yes.

MR. CAVANAGH: Yeah.

MS. WITTENBERG: Okay, Bud, I think you were next.

MR. BEEBE: Yeah, just a couple of quick questions. Forty-five companies or thereabouts are participants in CCAR. What percentage of the total carbon in California does that represent?

MS. WITTENBERG: You know, I don't know. We haven't made that calculation, but it's very small.

MR. BEEBE: It's very small. And then looking at the --

MR. CAVANAGH: Well, you got the utilities.

MS. WITTENBERG: Well, have all that --

(Parties speaking simultaneously.)

MS. WITTENBERG: -- we have all the power, yeah. We have all the power.

MR. CAVANAGH: You've got a fifth, at least.

MS. WITTENBERG: Yeah, we don't have transportation --

MR. BEEBE: Right, so you've got a fifth.

(Parties speaking simultaneously.)

MR. BEEBE: You might need a fifth if that's all --

(Laughter.)

MR. BEEBE: And the other one would be looking at the companies that have joined. What are the significant absences? You don't have to name companies, but what industries or types of companies are not coming to the table?

MS. WITTENBERG: Well, certainly oil and gas, bp being the shining example as a charter member, but after that there was a big fall-off. It's always been surprising that's little Silicon Valley Manufacturing. I know there's a lot of manufacturing there, but I mean they're considered progressive companies.

Calpine, of course, was a hand-raiser from the beginning, but very little -- and Byron Sher, who was really the founder of the Registry and who went back to Palo Alto and really tried to encourage membership, it really hasn't resulted in anything.

And, of course, you know, the auto companies. Although to be truthful, if an auto company joined today, it would be reporting its plant emissions, which would be nice, but not really where all the, you know, what the policy issue is around.

So although we'd love to have automakers just sort of because it kind of shows a good attitude. In fact, it probably wouldn't address in the way our protocols are set up, the actual vehicle emissions.

Yeah.

MR. PARKHURST: Can I address some of that since you picked on me a little bit?

MS. WITTENBERG: I didn't mean to --

MR. PARKHURST: That's okay --

UNIDENTIFIED SPEAKER: Well, rightly so.

MR. PARKHURST: It's okay, but --

(Parties speaking simultaneously.)

MR. PARKHURST: The first thing was about metrics. And that's something that a number of companies in Silicon Valley have looked very heavily at. Trying to measure something for like an HP on what our services end is on, okay, what is that metric for CO_2 on that.

Or even going so far as if you look at something like revenue, if you assume a very conservative revenue growth you can have a very impressive number out five years. A 2 percent revenue growth, in five years you can have a 20 percent net reduction in your CO_2 for revenue if you keep your electricity use relatively flat. Or even grow it at 1 percent.

So we've really struggled with it in looking at it, you know. Some of the other members of the manufacturing group, Bank of America and other institutions that don't have a widget, per se, that they can output, going to normalize using some type of metric is really hard to measure. And something that people struggle with.

And other companies like HP, where you've got a diverse portfolio of printers, servers, all of that, how do you measure it by.

MS. WITTENBERG: Okay, I --

MR. PARKHURST: With -- go ahead, go ahead. And then I'd like to talk about that Silicon Valley, one of the challenges we've had with CCAR, because we've looked at -- a number of companies have looked at it, and we've looked at it a number of times --

MS. WITTENBERG: So now I feel rejected.

(Laughter.)

MR. PARKHURST: I think one of the challenges is, and that's something where we'd like to work with you, is in using the tools that you've got. It's easy if you have just a few facilities that you're looking at. But when you start getting three and four and five facilities, the tool is a little cumbersome.

And that's where a number of companies, there have been 12 companies now, or 15 companies that have joined a Sustainable Silicon Valley, which they've made a pledge to reduce the CO2 emissions in the Greater Bay Area by 20 percent. We've had a lot more companies interested in that part because I think it caters a little bit more to what their businesses are like and how they're working on it.

And so I think that between that and some of the work you're doing, I think there's some definite cross-overs, because we're seeing an increase in interest in this, especially over the last three or four months, with many of the announcements that have gone on at the state level, we've got a number of CEOs that are contacting the manufacturing group and saying, hey, we'd like to get more involved in this. Here is our person in energy, or here's our person in environment, let's see what we can do about it.

MS. WITTENBERG: Well, in the first part, in terms of the metrics, I agree it's hard, but that doesn't mean you can't do it.

And I think what we've really come to in our thinking is in most industries, or I would say all industry, you can't just have one method. There's no single metric that will cover everything you need to report. And so in fact you'll need a bundle of metrics to be most useful.

And secondly, the way you get to those metrics is you have to have an industry, and that's just what we try to do with anything, Wendy, is to -- you have to just think it through and pay attention to it and focus on it, and then you can come up with the correct metrics.

I mean, you say, oh, it's too hard and there's so many ways we have to do it, and there's not a way to convene that group and that's what we'd like to do and really see as our role. So I agree it's hard, but it needs to be done.

In terms of a lot of facilities, we continue to improve the software. A lot of companies have many many facilities, you know, dozens. Matter of fact, we had to add international reporting because a company, I think Eastman-Kodak, has hundreds of facilities that they use the report. So I hadn't heard that before, but we're always trying to improve it.

In terms of the reduction, what's it called in the Silicon Valley --

MR. PARKHURST: Sustainable Silicon Valley.

MS. WITTENBERG: -- Sustainable Silicon Valley, I mean they came to us, the people who organized that, right away and asked if we could work together, and we were somewhat limited. We are limited by we have some prescriptive rules because we were formed by legislation. And because Sustainable Silicon Valley was only interested in a geographical area, it just didn't quite work, although we were willing to be as helpful as we could.

So it's not the same. Again, i goes back to entity-wide versus -- I'm going to look at this piece here, and it's one of the issues that we're talking about.

MS. SKINNER: I think I can speak loud enough, but -- Nancy Skinner, The Climate Group. I just wanted to comment on Diane and Ralph, some of your comments.

Diane, I really appreciated in your remarks your raising the whole issue of facility-wide versus entity-wide emissions, or indirect and direct emissions. And I think what's relevant for the Advisory Committee is, and it's, I think, a little bit different, the debate for you all on the Advisory Committee is slightly different than the debate that might occur in the Registry. Because the Registry, of course, is thinking about or had to design an inventory for companies. And then, well, there's a whole set of issues.

And the Advisory Committee, you're looking at climate change from the whole point of view of the State of California. And you're looking at if there -- let's just assume if there were a target or a reduction both in the State in the California, then what would be the variety of policies, programs, approaches, et cetera optimally for helping to meet that.

And what I want to speak to is I think it's very very important to factor in the entity-wide or the direct and the indirect. Because if we don't, then we remove any incentive from those entities, those people, those whatever in the state who are emitters primarily through their indirect activities.

So, in other words, -- and it's the majority of, if you think about it it really is the majority of us in the state. Most of us are not manufacturers; most of us are not burning fossil fuels directly. Actually in my house my water heater burns the natural gas. But, still, you know, I'm an indirect via my electricity usage.

So are most of the business entities, whether they're retail or whatever. And so if we eliminate that from the equation then we don't, in effect, really give them any incentive. And certainly we should give the generators incentive, yes. But we need to also give the users.

And especially given now I'll speak to our earlier discussion this morning about -- and this is -- this morning we had discussion around, you know, Tellus' numbers versus CCAP's numbers. And CCAP was using the numbers only of that which is generated directly in the state. And Tellus was incorporating numbers, in effect, from the grid.

And I think that why this is relevant, if we go back to Diane's comments, that I think it's very very important for us to count those full numbers in the grid because that's what we're using. And we, as electricity consumption grows, if it does, hopefully it doesn't, but it will, in the state, there will be more and more of the electric, that which is in the grid more and more will be that which is generated outside of our state.

So we don't have a way to count it. If we go, say, the RGGI process and only count, or only look at that which is generated right here, we're going to miss a big part of the picture.

Now, I know that there's all kinds of issues about, you know, the double-counting, and about if you're getting into carbon markets, you know, whose carbon it is and all that. But if we look at it from a positive perspective, which I think the Advisory Committee needs to, in terms of trying to achieve reductions from carbon that's generated by activities within California.

And you say activities within California, if I'm an electricity user, even if it's generated somewhere -- the electricity is generated somewhere else, if I'm using it it's being generated because I need it and I'm using it. So that carbon, I have to count that carbon somehow.

MS. WITTENBERG: Yeah, good point, Nancy; thank you. Ben.

MR. KNIGHT: I just have a comment and a question. As a comment, for light duty vehicles and light duty manufacturers, maybe typically 85 percent of the full life cycle carbon is from the fuel consumption during the life of the car. So probably appropriate metric really focus on areas is the fuel consumption.

And the manufacturing side, you know, there's a significant part. And I tend to agree with Peggy that some kind of energy per unit, some efficiency metrics appropriate with the upstream electricity main source being in the hands of the utilities.

So if you have a factory in the midwest the carbon for electrons a lot higher maybe than in California.

Question for you. I'm less familiar with the term entity and what the geographical and other boundaries are for that.

MS. WITTENBERG: Well, in the Registry, I mean entity can define any way somebody wants, but in the Registry the definition is an organization that is incorporated. So it would be a company or an organization.

MR. KNIGHT: Does that --

MS. PULLING: Can I give an example --

MR. BEEBE: That sounds so easy.

MR. KNIGHT: Yeah.

(Laughter.)

(Parties speaking simultaneously.)

MR. KNIGHT: Does that mean a company could be promoted in purchasing a low-cost carbon sink, I mean if you design it like that? Is that global?

MS. WITTENBERG: Well, you know, you raised a question that has not happened yet, but I'm a little worried that that definition could be gamed. Because currently when we say entity, for instance, PG&E, the electric utility, is different is a corporation, but so is PG&E Corp, right?

And so they would have the choice of whether they want to register the utility or the whole corp, which might have other subsidiaries.

That's fine. I mean people register and you know what it is, but I am a little worried that in the long run you could say I'm just going to buy this carbon sink, which I think is your example. I'm going to incorporate it as a company and just register that. Yeah, in which case we might have to change the rules. Kind of like the IRS.

MR. KNIGHT: And this also seems to have a big impact on pricing. I mean there's something constructive I understood about Ralph talking about at least for a given year, maybe a flat price versus a huge spectrum of pricing that is into a company's motivation, changing where their focus would be.

So for transportation, everybody expects that we should improve on energy intensity and have our focus there, for example, rather than our focus on where low-cost source is for carbon credit.

MS. WITTENBERG: So you're saying the signal should incent the right activities?

MR. KNIGHT: Huge implications to how you set that up.

MS. WITTENBERG: Yeah. We probably should --

COMMISSIONER BOYD: Diane, that's about it?

MS. WITTENBERG: Yeah, -- wind this up. Okay, thank you very much.

COMMISSIONER BOYD: Thank you very much, appreciate that.

(Applause.)

COMMISSIONER BOYD: Ned, it's time to turn it back to you and your group.

(Whereupon, the luncheon presentation was concluded, and the afternoon session of the public meeting was reconvened.)

--o0o--

AFTERNOON SESSION

--o0o--

MR. HELME: Just to clarify this last little discussion. Please be clear, CCAP is not arguing for leaving out the important imports, not at all. The point was simply to put out the inventory from CEC and have apples and apples to show you the Tellus inventory without the imports so it was apples and apples. It was not a policy recommendation --

(Parties speaking simultaneously.)

MR. HELME: We're completely in support of your view -- okay, you can come back.

(Laughter.)

MR. CAVANAGH: Ned, I think what would be tricky, though, is going back to the inventory numbers for 1990 to 1999 and figuring out how to impute an out-of-state value that was consistent with the ones we're using now. And I do still think that's going to be an interesting challenge for us.

MR. HELME: That's true, yeah. Okay, let me do a quick introduction for David. We're going to go to refineries; I didn't get to do it before because we were in a hurry.

David's been with us about a year. He's a PhD chemical engineer from MIT. He's been working on a program we called byproducts synergy which looks at opportunities to take waste from one industry and use it as a feedstock in other industries. So it's very relevant kind of stuff we're doing.

What we're going to go to now, if I could have everybody's attention --

COMMISSIONER BOYD: Folks, hello, can we get a little order in the room? It's getting hard to hear. Thank you.

MR. HELME: Okay, I'm going to go right to David and the work on refineries and manure digesters. We also need to get to the utility work and it's already 2:00, so we'll have to move a little quicker, but we'll try to do that.

So, David, you're up.

DR. WAGGER: Hello, again. Thanks, Ned, for the introduction. I want to thank Diane, who apparently isn't here, for her discussion during lunch because it has -- her discussion has extreme relevance to petroleum refining.

Some of you are petroleum refining folks, some of you are not. I'll just give a brief overview of what it is. Basically you take crude; you desalt it to get rid of solids that might otherwise foul up your equipment.

You separate it into different fractions according to boiling point by distillation. You take these different fractions, you further process them to produce a wide variety of products, gasoline, diesel, jet fuel distillate, contaminants. Largely sulfur and nitrogen are removed and captured by dedicated processes. One of those is (inaudible).

Refiners uses large amounts of natural gas. They purchase electricity and steam. They use byproduct fuels, such as refinery gas that is generated from the crude that they intake, which has interesting implications. And they use that for heat, steam, and then they have cogenerated electricity that they also make.

And finally, refineries emit large quantities of CO_2 and other gases. Some of them, there's a fugitive gas is often from leaking pumps and things like that, from fuel consumption and operations.

Here's sort of an overview of California refining. Fourteen refineries, four near here.

"Near" is in quotes. Ten near L.A. Operated by eight companies. Average daily through-put about 2 million barrels. I think that's a little high.

Refineries are more energy intensive than the U.S. average in California because of product mix as well as environmental standards. Refiners are among the largest users of natural gas and electricity. I think natural gas is one, electricity is two, although I could have that reversed.

Refiners consumed, according to LBNL's calculations, 400 trillion Btus of natural gas and crude byproducts, and 30 trillion Btus of purchased steam and electricity in 2001. My calculation is roughly 26 million metric tons from fossil fuel combustion by our findings in 2001.

This is a CEC number, about 1300 megawatts of cogeneration capacity in refineries. It's not well distributed. Some companies have a lot, some have none.

Again, CEC data, 9000 gigawatts in cogeneration, 2003. Sixty percent used in the facility, 40 percent sold.

Refineries are net sellers of electricity. Not necessarily per facility, but as a group. And this has extreme implications for some kind of CO_2 monitoring and trading. They emit CO_2 for the electricity that they sell, like you have electric utilities, which could mean if they were somehow sector-specific regulation, refining would probably spin off their CHPs as separate entities. Shell cogeneration facilities as separate entities to get it off their books so to speak. So it's an interesting implication there.

So here are some key assumptions in the analysis. No new refineries built in California, that is no new space provided for them. Increasing operable capacity at existing refineries, and I estimated the growth.

Rising capacity utilization to meet demand. And 93 percent about the current number, but if you're going to have higher demand and constrained supply you're going to need to be more efficient.

I calculate energy intensity, that is let's say unit of natural gas per product. Energy consumption of California refineries from LBNL's report. It was a March 2004 report looking at California specifically. With adjustments for hydrogen production from natural gas based on National Renewable Energy Lab data. They did a sort of analysis of a plant.

Now, interestingly, the adjustments made for the hydrogen made the energy balance work, as far as I can tell, the material balance -- what I mean is you look at all the natural gas reportedly going in and their use, it doesn't quite add up. There's something missing, which might have implications for the Registry as you go forward, trying to figure out what refineries are actually using in terms of natural gas and electricity and so forth.

I assumed that the cogeneration and purchased electricity numbers based on CEC data. Although purchased electricity seems to be somewhat of a response to are we running a deficit, do we need to purchase it to make up for what appears to be a deficit under current operations.

And the last bullet is a bit -- this is a bit tricky. I'm assuming the intensity of hydrogen production to produce cleaner fuels increases over time for that need. There's also an issue of whether refineries are going to stop importing hydrogen for their operations and generate it on their own, which would essentially transfer energy consumption into their boundary that was formerly outside of the boundary, which again has accounting issues associated with it.

Here are the uncertainties in the analysis. According to LBNL there is no publicly available data on energy consumption of refineries in California. That essentially means that you don't know what the greenhouse gas emissions are, because presumably there's a relationship between the two.

Different sources of data are not consistent and the inferred energy and material balances, which is for refineries kind of the whole is the basis for doing any kind of greenhouse gas analysis, they don't apparently work. And that might be an accounting, the data that we're using to base it don't work, or something else.

This third bullet, very interesting. Possible undercounting of natural gas consumption because natural gas is tracked largely as a fuel and not as a feedstock. And that gets right at hydrogen production, which is a major energy consumer in California refineries.

The question is it unrecognized. Is it an unrecognized process emission that is escaping inventories and essentially it's not on the books. It's not in the IPCC. According to the current rules, or the way you do it, IPCC does not recognize hydrogen production from natural gas as a process emission. The question is is it included under fuel or not. And that's a real big issue that needs to be resolved.

In terms of energy efficiency measures, there are very few publicly available data for implementation costs and energy saved. What I mean is when you're saving natural gas, are you saving steam that you generate onsite. Are you saving or being more efficient with refinery gas that's a byproduct of your oil. It's very hard to price a lot of those things.

So essentially, unfortunately at this time I was unable to provide abatement cost curves for refining just because the costs and the energy savings are a little bit unclear.

But I did attempt to estimate what future energy consumption CO2 emissions are, which is what I'm about to present.

This right here essentially is what the industry looks like or will look like. The top line is total optimal capacity, stream days per -- in stream days. Essentially that's all the equipment that's out there that could possibly work if it was operating.

Then you have the bottom line really is the triangles down there is what the through-put is. It goes from a little under 1.9 million barrels a day up to about 2.15. That's about 16 percent increase per day in through-put.

MR. CAVANAGH: Without building any new refineries?

DR. WAGGER: I assume that essentially the 14 are there. You can increase capacity utilization, which means you essentially don't allow equipment to be offline. Because unless they're going to site a new refinery I'm just not clear that you can actually build any more new capacity in a greenfield. And we have opinions about what should be the future of that, whether you want to create a refinery in the future in some place to exhibit the best technology to see what's possible.

Okay, this is a baseline fuel

consumption by general use. And by general use there's processing needs, firing distillation column or some sort of equipment cogeneration for onsite steam and electricity, as well as selling the electricity. There's some onsite purchased steam.

The bottomline is total onsite electricity consumption appears to increase about 27 percent from about 450 to about 550.

And you also notice that there is a decrease in the onsite steam generation, which is compensated for by the increase in cogeneration in the triangle, or over-compensated.

This is fuel consumption by fuel. I want you to know in the dotted line, that's natural gas feedstock. That's not a fuel. It's essentially a chemical transformation of natural gas to hydrogen. You need steam, which requires energy for that. So the whole energy implication to the natural gas feedstock.

But looking at the actual fuels that you burn for steam or heat or cogeneration, the upper line is the same one as before. Refinery gas increases a little bit, and that's a byproduct of oil refining.

The squares are natural gas. I have default in there. I probably should have written inferred. But to make the energy balance work, basically you have all of this energy and you have to make up the deficit somehow. So what I did is I inferred that the deficit was natural gas.

And that appears to increase quite a bit, largely because of intensity, probably of hydrogen production as well as just the increase in through-put.

I think I will skip this one in the interests of time.

This one is interesting insofar as if you look at the top line, the squares, that's cogenerated electricity. If you look at the squares in the solid line, the open squares in the solid and the dashed lines, those are essentially what's used onsite, which is the upper one, the undashed, solid line. And the lower one is the dashed line, which is what's sold.

The solid line without symbols, that's consumed. And you can see that there's consumption increases, but so does consumption of cogenerated electricity. And you'll notice that by default again the triangles, basically they're purchasing less over time. Basically what they're doing is they're importing CO2 onto their facility at the expense of indirect that's generated somewhere else, maybe elsewhere in the state, or maybe in a neighboring state in a coal plant.

Okay, here is the kinds of numbers you're interested in. 2010, the upper line is direct and feedstock, 37 million metric tons. About 31 is fuel, about -- sorry, the diamonds there, the number's a little bit low -- 7.6 is the diamonds, which is -- sorry, 7.6 -- all right, what did I do here -- 7.6 is the natural gas, I'm sorry. And 6.3 is the feedstock.

If you look at 2020, about 42 total; 34 from total fuels, 7.5 from natural gas feedstock; and then there's 9.5 on natural gas for fuel. Trying to give you a sense of where the natural gas is being used, and in what quantities.

This is indirect electricity. Basically the falling line is basically less purchased electricity, which is the triangles dropping. And a slight increase in purchased steam because essentially you need to have higher steam requirements in the cogeneration. Still doesn't quite cover the total requirement for steam.

Bottomline message here is that indirect is a fairly small number compared to direct. And it's actually dropping. You see 1.5 and 1.2, whereas the direct is increasing at 37 to about 42 from 2010 to 2020.

The numbers on the far right are cumulative over time, which would set a denominator if I had reductions for you to figure out what the percent would be.

So here's sort of a summary. Daily through-put increase is 16 percent. Fuel consumption increases about 27 percent. And then there are relative reductions or increases in refining processes, utilization, steam requirements and cogeneration.

Natural gas consumption increases 58 percent from fuel. And 42 for feedstock. The reason the feedstock goes up so much higher than the through-put is I'm assuming greater intensity. And that sort of is a cumulative thing, kind of like compounded interest.

Electricity demand increases 19 percent. Cogeneration capacity increases 56 percent. And you see cogenerated electricity increases 52 percent. You're getting slightly, I believe, increased utilization of the capacity. Purchased electricity drops, so the direct effect becomes less important over time, absolutely as well as relatively, which has implications for CO2 accounting within refineries.

CO2 emissions from all fuels increases 25 percent. Natural gas about 42. Again, this is feedstock. Direct emissions 28 percent. And indirect, they decrease 31 percent.

Essentially the next step, and this might involve many of you in the audience, is consult the industry for better data on exactly what the fuel and feedstock inputs are to get a better idea of what they're actually using, what they're actually emitting.

Conduct further research on the cost and energy benefits of energy efficiency measures in consultation with industry and other experts.

Improve material/energy balances for California refineries. That's the key to figuring out what this all means.

Re-evaluate GHG emissions from refineries, and then evaluate the potential of measures, which there are not good numbers for yet, to reduce emissions going forward.

Yes, questions?

MS. MICHELSON: Yes, David, excellent presentation. A lot of good information in a relatively short period of time. Sorry. Denise Michelson with bp.

DR. WAGGER: I thought maybe --

(Laughter.)

MS. MICHELSON: I'm not a chemical engineer, but throughout my career it's primarily working downstream, refining and marketing. And so I have a little bit of applications engineering experience when it comes to --

DR. WAGGER: Sure.

MS. MICHELSON: -- especially these numbers with my particular company. And I encourage you , like in your next steps, to work with the trade associations, American Petroleum Institute and Western States Petroleum Association. They have a lot of good data that might assist us with making these very very complex projections.

And I understand --

DR. WAGGER: Sure.

MS. MICHELSON: -- the financial analysis, even though, you know, I'm more technical in that -- I don't mean to oversimplify the fuel/gas balance of a refinery, but as we looked at this, generally internationally accepted protocols for calculating CO2 emissions --

DR. WAGGER: Sure.

MS. MICHELSON: -- coming from the oil and gas industry, and the exercise that bp went through, we're looking at, and if I may talk about Diane Wittenberg's --

DR. WAGGER: Sure.

MS. MICHELSON: -- protocols, when we broke down our CO2 emissions, direct and indirect, into the five categories in the CCAR protocols --

DR. WAGGER: Um-hum.

MS. MICHELSON: -- it's primarily combustion emissions associated with the refinery fuel gas or natural gas. So when you talk about the production of hydrogen from the hydrogen heaters, it's fuel consumption.

When you talk about emissions coming from the cogen it's primarily fuel consumption.

DR. WAGGER: Sure.

MS. MICHELSON: And so I guess I say that to say that the information is there, and there's a lot of good information out there. So anything that I can do as bp, or --

DR. WAGGER: Sure.

MS. MICHELSON: -- put you in contact with the trades, I'd be more than happy to do that.

DR. WAGGER: I certainly appreciate that. Again, if you want to compare this to the state of knowledge of the cement industry, the cement industry is probably five or ten years, at least the analysis, ahead of petroleum right now.

MS. MICHELSON: One other comment I might add --

DR. WAGGER: Yes.

MS. MICHELSON: -- about the slide where you had the --

DR. WAGGER: Give me a number --

MS. MICHELSON: -- energy intensive all operation is because of the California programs. bp found that we were more energy efficiency, as well, --

DR. WAGGER: That's right --

MS. MICHELSON: -- in addition to our brethren across the nation --

DR. WAGGER: Sure.

MS. MICHELSON: -- as a result partially

because of the rigorous environmental programs that we have --

DR. WAGGER: Right, right.

MS. MICHELSON: -- here, too. So although we're energy intensive, because of California --

DR. WAGGER: Right.

MS. MICHELSON: -- programs, we're also energy efficient.

DR. WAGGER: Right. That's a good point. Those two metrics are basically at right angles. One's sort of vertical; one's horizontal. You can be efficient for what you're doing, but in terms of the product mix you're making, and it's again sort of apples and oranges, it tends to be more energy intensive. But they're not inconsistent; they're not mutually exclusive. And that's a very good point.

MS. MICHELSON: Thanks, again. Good presentation.

DR. WAGGER: Sure. Thank you. Thank you. Now, here's a quick -- this methane, the digester overview was actually done by my colleague, Matthew Ogonowski, who was unable to join us.

Here's an overview. 1999 emission for manure management totaled about 5.2 million metric tons. It's about a little over 1 percent of gross emissions in 1999.

Manure management, I guess, represents one of the fastest growing sources of GHG emissions. Presumably the manure that's being managed, the emissions from that is 5.2 percent. It is a growing emission at an average rate of a little over 5 percent from 1990 to 1999.

Installation of biodigesters can recover manure methane for onsite fuel use, presumably burning it, let's say, for a water boiler or something. Or you can convert it to electricity, reducing greenhouse gas emissions and improving air and water quality. And California dairy farms have a large potential for biodigester use.

Here's key assumptions in the analysis. It was only using dairy farms for at least 500 cows. The number of dairy farms was assumed -- the number of dairy farms at 500 or more was assumed to increase at a rate of 5 percent through 2010, and then remain constant.

The program of implementation was phased in over time, ten per year, going forward from

2006. Federal production tax credit for renewable power generation is renewed at 2025 at current level. Digesters receive this credit for ten years, but they don't receive any state funding or credits for the analysis.

Essentially 100 percent of farms the excess of electricity generated is net metered back to the grid. That's a very uncertain assumption. And there are many people who can answer the question what is a true number. Is it 50 percent, is it some other number.

The price received by farmers for net metered electricity equal the price paid by farmers to produce electricity from local grid. Again, that is also somewhat of a uncertain assumption.

And GHG savings are both from reduced methane, as well as CO2 displaced from the grid. And, again, like before, cash flow is just counted at 7 percent back to 2005.

So here's a summary of the numbers. There are no graphs for this. Essentially in 2010 you get an annual reduction of .4 million metric tons of CO2 equivalent. In 2020 it rises to 1.2, and that's because by that time all the farms, or at least the 150 farms that are in the program, so they're presumably all operating.

Cumulative over the time is 16 million metric tons. It's a smaller number than the 1.2 would suggest, because the first 15 years are phased in.

The net savings, it's about 60 million cumulative over the 20-year period. The net savings per metric ton of greenhouse gas reduced is about $4. Essentially the conclusion is the use of digesters can achieve significant reductions of net savings. And net metering is the key. Without it, greenhouse gas reductions would likely have a positive cost. Essentially you don't get the benefit of sold electricity.

MR. CAVANAGH: So you're basically assuming you can shift some of the cost to the utility?

DR. WAGGER: That's essentially right, yes.

MR. CAVANAGH: Okay.

DR. WAGGER: Yes. Again, as I mentioned before --

MR. CAVANAGH: It's not a net savings to society?

DR. WAGGER: Oh, no, I don't think we looked at that at all --

MR. CAVANAGH: Where is Hertel? Okay.

(Laughter.)

MR. CAVANAGH: Got'cha.

DR. WAGGER: Yes, that's right.

Okay, next step. There's a significant potential for achieving much larger reductions in methane emissions by digesters.

The current methane emissions from all dairy, from large dairy farms are about 7.5 million metric tons. It's projected to be increased to about 10 in 2010 and after.

The next step is to examine the ways to increase reductions from this sector, to encourage implementation, presumably biodigesters.

And we are currently looking at the following issues, net metering; transmission requirements constrained to the existing farms; potential programs and incentives for implementation and monitoring and verification requirements.

Which leads me into the next -- this is generic -- to essentially reduction potential in the industries. We have these options:

Technology mandates for efficient equipment and processes. Will we end up over-investing in the wrong technologies. That's an important question to have some sense of.

Cost sharing the public funds to overcome financial barriers. That's an option. Are there enough public funds for it. Will reliance on public funding actually slow down the rate of introduction of efficient technologies.

And would dedicated industry tax, let's say in the case of cement, you tax the cement that's produced, would that create a competitive disadvantage for the state industry. And actually sort of be self defeating.

There's the issue of recovery of capital and opportunity costs by the state tax code. Would the reductions from tax provide enough funds to spur implementation. And would reliance on the reductions actually be an impediment to going forward and achieving reductions more quickly.

Then there's the issue of negotiated voluntary agreements, which I believe Diane and others have talked about. And then there's the issue of, or the possibility of a cap and trade program, but those have their own issues.

Development of industrial baselines without the policies so you can figure out what the real benefit has been.

Determination of the technical potential for reductions, which gives you a sense of what's possible. Especially if you have to create a cap, and then offer tradeable allowances beyond carbon. Figure out what the cap is and figure out how much you can trade in allowances and have it distribute them among the industries involved.

Essentially setting the cap off of -- across all industries, yes or no. And then allocating allowances.

And then there's the issue of verifying, which I think others have talked about. How do you measure greenhouse gas emissions. Is it an input or an output approach, or both. To make sure that the input matches the output. And if they don't, there possibly is something missing from the balance.

And then calculating, recording and memorializing, from my previous days, essentially keeping records permanent so 20 years from now you can look back and see what yesterday's emissions were.

Determining what the actual emissions are. Facility baselines. Indirect GHG emissions, double-counting. If it's voluntary will people claim credit for the same emission reductions and things like that.

Computing true GHG emissions relative to the baselines. Are the end effects. Can you sort of throw, like you do accounting, can you throw revenue or costs in another quarter and attribute it to another year, and you sort of get a little bit of fungibility and game play.

Then there's the issue of verifying reductions, third party or government agency to vet the actual reductions.

Public record versus confidentiality. If I were a smart engineer could I reverse engineer all your processes and beat you competitively by knowing what your emissions are. Interesting question.

Enforcement. Defining material noncompliance. How do you identify those companies in material noncompliance. And how do you punish them or penalize them. Do you actually do it publicly. Do you say they're a bad actor and everyone should know about it.

And then here's broad conclusions from industrial analysis. Reductions are possible or likely possible at net savings. For cement, on an annual basis, it's .3 million metric tons. For the at-net savings. And about 1.2 if implemented totally, at least according to his scenario from dairy farms.

Additional reductions likely possible at low cost. And for a case of blended cement and the CemStar cement, not quite 2 million metric tons a year, if you can get it all implemented.

There are significant technical and policy issues for implementing measures and verifying the reductions. And further study and evaluation of the industrial sector are necessary to determine future emissions and the reduction potential.

And, again, looking at petroleum refining, as well as electronics, food processing and chemicals, which are all energy-intensive industry, although not necessarily the same size.

And that concludes my presentation. Questions?

MS. YOUNG: I had a question about the methane emissions.

DR. WAGGER: Yes.

MS. YOUNG: How do the methane emission levels from the agricultural sources that you're talking about relate to levels from say landfills or sewage treatment processes?

DR. WAGGER: Okay, actually somewhere actually --

MS. YOUNG: Do you have that?

DR. WAGGER: I have an extra slide just in case -- thank you very much. You want to look at this bullet right there -- don't have my pointer with me, unfortunately.

There's methane, I wrote it chemically, a chemical engineer bad habit.

MS. YOUNG: Oh, there we go, okay.

DR. WAGGER: So basically methane from the energy sector is dropping; agriculture is going up. Solid waste and waterwaste, basically treatment, and landfill, put landfills, it's larger than agriculture, but that one's dropping while --

MS. YOUNG: It's dropping, okay.

DR. WAGGER: -- agriculture's increasing, so essentially --

MS. YOUNG: Not as big a concern?

DR. WAGGER: Well, it's going in the right direction, so essentially presumably what's going on is actually good and working. Whether you can intensify that to make it drop faster, I don't know. But agriculture is going the opposite direction, so you clearly need to make the arrow point down if you want the reductions.

MS. YOUNG: Okay.

DR. WAGGER: So, --

MS. PULLING: Just one other comment on methane digesters. If you are going to pursue it further I'd encourage you to get in touch with a group called Sustainable Conservation.

DR. WAGGER: Sustainable Conservation.

MS. PULLING: They're based here in San Francisco, and they've really been -- they're an NGO; they've been working very closely with the dairy industry on methane digesters. And they know a lot about some of the technical challenges and ins and outs of the electrical standards --

DR. WAGGER: Right.

MS. PULLING: -- for hooking up digesters to the grid.

DR. WAGGER: Right, right.

MS. PULLING: The other comment I would

have, just from my peripheral knowledge of the digesters is that the numbers may not be super compelling from the greenhouse gas perspective, but if you look at the co-benefits, they're huge. Water --

DR. WAGGER: Would you give me -- right.

MS. PULLING: -- pollution --

DR. WAGGER: Right.

MS. PULLING: -- criteria air pollutants, so, you know, --

DR. WAGGER: Right.

MS. PULLING: -- there may be co-benefit reasons for pursing it even if the greenhouse gas reduction number, you know. Your assumptions, I think, are not very conservative.

DR. WAGGER: Okay, that's fair.

MS. PULLING: And so I would imagine that in reality that 1.2 million, whatever --

DR. WAGGER: Million metric tons.

MS. PULLING: -- million metric tons of CO2 may be a little bit idealistic.

DR. WAGGER: Okay.

MS. PULLING: But that's not to say that methane digesters aren't worthwhile for all sorts of other reasons.

DR. WAGGER: Well, you raise a good point. If there is a co-benefit that actually has a value, I don't know if let's say dairy farms are regulated for nitrogen runoff, but if they are, and they can do this and it basically saves them money on nitrogen runoff costs, that should be included in the analysis. And therefore the co-benefit could be incorporated if there actually is a true out-of-pocket cost currently.

MS. PULLING: Talk to the Sustainable Conservation; they're really -- and the dairy industry, --

DR. WAGGER: Okay.

MS. PULLING: -- Western Cattlemen's Association here in California. United Dairymen, sorry.

DR. WAGGER: Okay. Well, thank you very much, that's very helpful.

MR. HELME: Wendy, you think 15 percent is optimistic by 2020? Because we looked at this number pretty conservative. We were assuming only 15 percent dairy farms over 500 head of cattle --

DR. WAGGER: We'll do it --

MS. PULLING: No, it was the --

MR. HELME: -- this program.

MS. PULLING: No, it was the net metering and the --

MR. HELME: Oh, okay.

DR. WAGGER: We recognize that those assumptions are -- and if they're unrealistic like you say, then it would be less.

But if you could burn it, let's say you were buying natural gas to say do a hot water heater or some sort of operation on the dairy farm. You could pipe the methane into that, and you would just not buy natural gas. And that would also be a net savings.

That wasn't done in the analysis, but presumably that could be done. And actually the cost savings might be comparable. So there might be a way to save the number even if it's not net metering.

But thank you; that's very helpful. I'll pass it on to my colleague, Matt.

MR. SALOUR: This is Dara Salour; I'm with RCM Digesters. And I just wanted to make a few comments.

DR. WAGGER: Oh, sure.

MR. SALOUR: With regard to --

DR. WAGGER: Do you want to stand up

here?

MR. SALOUR: No, I'm quite --

(Laughter.)

MR. SALOUR: With regard to net metering I just wanted to point out that in California we have net energy metering as opposed to net metering at the full retail rate. So I don't know exactly how you came up with those calculations. But that's a factor as far as the payback to the (inaudible) is concerned.

DR. WAGGER: How does that, let's say, price they get for the net metered electricity compare to let's say what they're charged if they buy it? I mean is that much lower? Or are they getting sort of a benefit, or basically being the utility, or the grid is required to buy it at 10 cents a kilowatt hour regardless of what the current rate is?

That's kind of where the numbers sort of intersect the, sort of the analysis.

MR. SALOUR: It is much lower because the demand and the other charges, for example, NDDC and other types of charges are not taken into account, as opposed to for solar and wind where it is full retail net metering.

DR. WAGGER: I see.

MR. SALOUR: So it makes a difference.

DR. WAGGER: Is that a regulatory change then that has to be made to put it on par?

MR. SALOUR: Probably to the legislation that put that net metering law in place. That's, I think, AB-2228.

DR. WAGGER: Okay.

MR. SALOUR: The other thing I wanted to mention is interconnection of these types of distributed generation facilities. In rural areas it's really costly. We're finding that for each application it's costing around $30,000 to put them in. Because generally they require transformer upgrades --

DR. WAGGER: Right.

MR. SALOUR: -- and other types of upgrades that you don't usually get when you're doing distributed generation in urban areas.

DR. WAGGER: Right, I see your point.

MR. SALOUR: So those are some of the barriers that are being faced.

There's another one that's also they're coming across very recently, and that's with regard to NOx pollution from waste gas-fired engines.

The majority of these engines are smaller in size, they're about 140 kilowatts. A 1000 cow dairy approximately produces 140 kilowatts. And the majority of the dairies in California are in the San Joaquin Valley. And the San Joaquin Valley Air Pollution Control District is proposing to put in NOx emissions from waste-fired engines of about 50 parts per million NOx.

And those emissions criteria are pretty much derived from landfill gas fired engines that are on the megawatt scale. And typically larger engines, lower emissions come from them. So that's a problem that we're beginning to face as of the beginning of this year.

DR. WAGGER: Um-hum.

MR. SALOUR: So, what's effectively happening is air pollution control measures that are being implemented for NOx are going counter to those that you are looking at as being benefits for greenhouse gas reductions.

DR. WAGGER: I see. That's interesting. Thank you very much.

MR. SALOUR: Sure.

DR. WAGGER: Cynthia, a question?

MS. CORY: I've been called a lot of things, but I've never been called a manure digester expert.

(Laughter.)

MS. CORY: When I saw this, the detail it was, I called my colleague from Western United at lunch, who is -- excuse me, I haven't been talking today because I'm about to lose my voice -- but I'm glad that the gentleman from RSM brought up the point about the NOx rules that are about to go into place in the Valley, and how that's going to be an impediment for the dairies.

And the other point that he brought up was on the net metering. And I think you brought that up.

Western United is going to carry some legislation; it's going to introduce some legislation for net metering. But I guess historically, again I'm not an expert at this, but there's been a lot of resistance to this from just institutional resistance to this.

And I think we've got --

(Laughter.)

UNIDENTIFIED SPEAKER: How diplomatic.

MS. CORY: And I think, you know, if

we're trying to find ways that we can work together, you know, I'd like to throw that out there. You know, if we're going to have some net metering legislation, maybe the people at the table can help us make that happen.

And if we can't, maybe this is the place to try to talk about it. I know that Robert and I are going to be tasked with, in our subcommittee, going into this in greater detail. So maybe that's something we can look at.

Because Robert was like looking at me earlier today and going, you know, hey, well, you know, can't you make this happen. And I underlined, yeah, but the net metering; you have to have net metering or none of this is going to happen.

And he goes, well, what's the problem with it, and I just kind of said, we'll go there.

(Laughter.)

MS. CORY: But, you know, I think that it's nice to talk about, and it's nice to look at the silver bullets, but I think we've got a number of things that aren't going to make it a silver bullet. But we're certainly willing, and when I say we, I mean the agricultural industry, as the dairy industry being a part of it, trying to do whatever we can to help make it happen. I just want to make sure we don't think that it's just going to be really really simple.

DR. WAGGER: Thank you very much.

MR. PARKHURST: I was curious why these three scenarios were picked out of anything. What made you choose these three as opportunities for California?

DR. WAGGER: If I go back to the slide that I didn't have, the big picture slide, which is stuffed at the end, so thank you also for having me do this.

This attempt to look at where the emissions are and the data sources don't always match with other ones, so don't focus on that. But it's really about looking at CO2 combustion, 1999. The top line numbers, 210, 92 and 80 and 8 are right out of the 2002 greenhouse gas inventory, right off the table.

You look at industry, it's 92. That's the next biggest after transport for CO2. I have quotes around industry because all of nonregulated utility electricity generation was folded into industry in that inventory. So true industry is probably a bit lower if you take out the nonutility electricity generators, stand-alones. They just exist to convert fuel into electricity.

Essentially that's the next biggest sector after transport. So basically you got to look there.

Cement, you see, the next line, process emissions 6 from calcination and cement. That's processed, but they also use a lot of fuel. So it seemed like a natural place to look for emissions reductions. And there are data to do the analysis, so that's great. That's exactly the kind of thing that's presentable.

Petroleum refining is the largest, I think the largest natural gas, and the second-largest electricity user. That's also a big potential source of reductions going forward. Unfortunately, the data aren't as robust for that as cement. But it's something definitely that has to be looked at.

And then finally the dairy farms. You look at the agriculture numbers under methane, it's the only one going up. So within that we just take that out because that was amenable to analysis. And, again, the theory of potential, a large amount of reductions are theoretically available there. So that's kind of the rationale that I did not present, because, Ned, I believe, sort of gave that earlier.

MR. PARKHURST: So with these three you've got five metric tons for manure, so you've got 5 percent there. I can't remember what Jason said earlier on the other ones. What are we talking? Are we talking 15 percent of that 92? Where are we in capturing that? And then what's the --

DR. WAGGER: Right.

MR. PARKHURST: -- rest of it? And the reason I ask is are we looking at something going back to the earlier presentation from Tellus is, are we looking at energy use at facilities as being the largest part? Or is it more of a manufacturing process type energy use like the manure management or the refinery or the other --

DR. WAGGER: Well, if I understand your question, and let me try to answer. Correct me if I don't answer your question.

Process emissions, basically noncombustion emissions, are relatively small compared to fuel. And the IPCC is a standard that everyone uses to categorize and to actually track emissions, whether it's combustion or process. There are very few process emissions identified by the IPCC as separate from fuel.

I think they omitted hydrogen production from natural gas. And that's a big one. I think that's a major omission and something that should be looked into to make sure it's not being counted elsewhere under a different name.

So, process CO2 is a fairly small contribution. You can't get a lot of reductions because it's so small. You can get large percentage reductions, perhaps, but absolutely it's a small part of the pie.

The next biggest place is industry. Now if you believe the newer data below, if you try to reconcile electricity and industry into electricity production, no matter who does it, and then industry, 66 is the next biggest so-called identifiable pot to get.

You need to look in there. Industry is so broad that even if there were ten industries in there, it's six per industry or something, which is not the case. But each industry is a portion of it. Again, you're dealing with reductions from a small segment of a larger pie.

I'm hoping I'm getting to your question. Again, we need to go after everything. It's kind of, you know, --

MR. PARKHURST: I guess I, you know, I was thinking of what's the 80/20 rule on the industry. Where are 80 percent of the emissions coming from? Is it coming from the three that you've identified, or were those the ones that you went after because the data was available and there wasn't some background to go with?

DR. WAGGER: I think -- well, cement and petroleum are generally identified as the largest CO_2 emitters. You look at any kind of international workbook on where the big CO_2 emissions; they always point out cement and petroleum.

MR. PARKHURST: But is that the case in California? Do we know?

MR. HELME: Yeah, we've said the inventory was 50 million tons a year. This is 37 from refineries, and 6 from cement, that's 43 of the 50.

MR. PARKHURST: There you go, okay. Thank you.

DR. WAGGER: Of industry, yes. But of the larger pie you're talking about roughly 430. So it depends on which denominator you use to get a fraction.

MS. DUXBURY: But I think Robert raises, or at least is alluding to an important point here which is you say we need to go after everything. But the stakeholder group has a limited time and a limited amount of opportunities to get together and to meet. And we can't address everything.

I think we have to either decide we're going to go after a few big ticket items, or perhaps get at some major reduction ideas. Or we look at, you know, not so big ticket items, but are low-hanging fruit that are easy recommendations that can be achievable.

But I almost feel like we're spreading ourselves very thin right now and --

MR. HELME: I don't think that's right, Peggy.

MS. DUXBURY: -- we have a limited amount of time that we all can come together to start helping advising the Commission. And I --

MR. HELME: Peggy, I think at our previous meeting we talked about where we should focus, and this was the recommendation.

This is the biggest part of the industrial emissions, that's why we did -- the two, cement and industrial is, you know, 85 percent of the total industrial emissions.

We haven't gone after high GWB gases because that's being done by somebody else that we brought to this group.

In terms of the ag thing, as David said, biodigesters is the best target. Most cost effective, biggest part of the tons, one that's growing.

So I think we've gone after the biggest ticket opportunities in those sectors. Now, we're going to go back and do transportation. We've talked about that in a subsequent meeting. The sense of this group last time was let's do industry this time because it's something we don't know a lot about. We'd like to see that, so that's what we did here.

So I think we're sticking with that; we're not going after the little -- there's lots of jots and tittles and a million ton here, a million tons there. These are the biggest ones. And we're certainly open if you've got something else you think should be on this list for the next meeting, tell us and we'll certainly go after it.

But that was the goal, was to try to pick the most, the largest and potentially the most cost effective. And I think we've done that.

MS. PULLING: I would just say if that's going to be our path forward then, Commissioner, we may want to make sure that the representatives from those industries are included in the conversation. Because I think if they aren't we may find that any recommendations we come up with for cement, for example, will be unwelcomed by that industry.

There is a lot of work going on, I know, in the methane digester. Cynthia's alluded to some of the challenges there.

So I think from a process point of view, we may not be the right people around this table to necessarily bite these off much further.

MS. DUXBURY: I think that's probably a better way to say it, Wendy, than perhaps -- looking at who, the talent you have here, are we the right people. Because all of this is an area that certainly, from my perspective and my company's perspective, I can't be making recommendations on these matters. Nor would it be appropriate.

MS. YOUNG: That's part of the beauty of a stakeholder group, right?

I had a question, two short, and I think, related questions. First, I'm really impressed with all the inventory work that you pulled together so quickly.

And my first question is when do you think the inventory process will be finalized?

MR. HELME: David could tell you on refineries.

MS. YOUNG: Just, I ask because I know it's a huge, huge task.

DR. WAGGER: Right, right. As I mentioned in the petroleum part, and I think Denise alluded to, I didn't really talk to industry, especially the ones in California.

Again, there are only 14 refineries. I mean there really isn't an average refinery. If there were 1000 maybe there is one. But 14, each is different. It's configured differently.

You know, if one has two processes, that should actually be complementary like this, and one has it like this, their costs are going to be way different. And the same type of measure, that if you would mandate it, may not be applicable to all of them.

So really more and more research on California petroleum specifically needs to be done before you could -- that's my view, anyway.

MS. YOUNG: Yeah, I'm thinking the big statewide inventory. The big process. What's the timeline for that?

MR. HELME: Well, we have the Tellus data like presented earlier, gives you a good look at that. And we need to disaggregate it a little bit because it doesn't quite break down in industry, that sort of thing. But basically we're pretty close, I think.

MS. YOUNG: Okay, good.

MR. HELME: And it's going to be run back, Mike's done it already in terms of running it by the agencies in California to be sure they're comfortable. And we're comparing it to national numbers, USGS, EIA, et cetera, to be sure. We're getting close, but --

MS. YOUNG: Good.

MR. HELME: -- you know, again, David's point. This hasn't been done in any state. We work in a lot of states. Nobody's dug into it. This is the first place where we're really trying to dig into it for refineries. You got a big refining sector, you know, that sort of thing.

MS. YOUNG: Right, and --

MR. HELME: So some of this stuff is new work, it's groundbreaking work.

MS. YOUNG: And it's critical in terms of helping drive the policy decisions. And so that's my -- my second question is, Commissioner Boyd, I almost, you know, hate to ask this, but is there an open -- is it a crazy notion to put on the table the possibility of extending the timeframe of this Committee in order to be able to really consider, you know, more work on the inventory as it comes out, so that we can actually have a finished product and not feel quite so time pressured?

I know that's not what people signed on for, but I'm just wondering, thought I'd put the question out there.

COMMISSIONER BOYD: It's not beyond my thinking that you may need more time. But you also have to inventory the group in terms of the time they have to --

MS. YOUNG: Yeah.

COMMISSIONER BOYD: -- to donate, or to attribute to this effort. So, it's going to be a little bit of a mix of both of those things.

And while I'm speaking, let me ask Tim and Susan, when is our next inventory? But it's not going to be cut at this level. When is the next statewide inventory?

MS. BROWN: It should be complete in the spring.

COMMISSIONER BOYD: And released --

MS. BROWN: As part of the Integrated Energy Policy Report --

COMMISSIONER BOYD: Right. I mean released --

MS. BROWN: -- it'll be in the spring.

COMMISSIONER BOYD: -- by November of this year, but maybe --

MS. BROWN: Oh, yeah.

COMMISSIONER BOYD: -- the data's available a lot sooner than that.

MS. BROWN: I'm hoping by --

UNIDENTIFIED SPEAKER: Probably the April timeframe.

MS. BROWN: -- April is --

COMMISSIONER BOYD: Okay.

MS. BROWN: -- what the deadline --

COMMISSIONER BOYD: But that's, again, the big broad cut, just updating the statewide inventory from the '99/2002. We did it in '99; it took until 2002 to get permission to publish it. Anyway.

MR. HELME: I think the other point to make here, I made it earlier but I think it's important to emphasize again, is unlike in New York or a lot of states where you basically go transportation, utilities, forget about everything else, California you got to go a lot of other places to get there.

You've got a much different inventory. We had some slides we didn't show you comparing you to other states. You got a lot more in industry, a lot more in ODS substances, you know, agriculture. It's a much more diverse mix than the typical state. You know, you don't have a bunch of coal plants you can just cut off and say you've solved the problem.

So I think this is a bit more of a challenge.

DR. WAGGER: Any other questions? Okay,

thank you very much for allowing me to speak.

(Laughter.)

MR. HELME: Okay, we're going to go to Stacey's presentation now on the modeling on the first round of work that's been done by Tellus on the utility modeling.

(Pause.)

MR. HELME: And you all know Stacey. She's been to some of the meetings before. She's our Senior Policy Analyst; she was a team leader for domestic climate work. And specialized in electricity.

MS. DAVIS: Great. Step to the side here so people can see a little bit.

This presentation will cover the preliminary basecase that we developed for the California power sector in connection with Tellus. And it's a work in progress, so we're looking for some feedback on especially some of the assumptions I'll be talking about, and looking for your first reactions to the basecase that I'll be showing.

And also, while it will be a repeat for some of you, I'm going to be going through some of the background on the power sector analysis that we plan to do, so you can see this work in context. And feedback that you might have on the modeling scenarios are also welcome.

Just background on the power sector, a lot of this has already been covered, but the power sector emissions in 1999 were only 57 tons, which is lower than most states in terms of percentage of greenhouse gas emissions, 13.3 percent. And in many states it's up to a third of the total.

So as far as an opportunity it's less than a lot of other places. And the types of fuels that are used, in terms of producing this power, is primarily natural gas. While maybe 10, 15 years ago you had some oil. Now it's down to a very small fraction of the total. And so it's primarily a natural gas picture you have here. There's no coal to speak of in the power sector in the state.

And, of course, you've been talking about the out-of-state emissions that are coming in from the southwest especially. Much of that is from coal and that's going to drive a lot of the focus of our analysis here with the power sector.

MR. HERTEL: Excuse me, you said much of

that is from coal? Do you know how much?

MS. DAVIS: I don't. But I do have the numbers; I can dig that up as we go through the inventory and projections, the reference case, in more detail. We've only had it for about a day, so. I pulled out some things for you that I was able to glean, you know, off the bat. And we'll be going over it in more detail in the next couple weeks, and giving especially the power sector workgroup more as we --

MR. HERTEL: I don't know how much much is, but my impression is that for our company, the profile is something like 20 percent of the imported power might be from coal, but not much more than that.

MS. DAVIS: As a percentage I'm not sure, but it's close to half now of the total greenhouse gas emissions, especially with California energy demand.

MR. HERTEL: Yeah, the point I make is that going forward most of what we see being built is gas in the southwest.

MS. DAVIS: And that's actually reflected in the modeling. Well, some of the implications for the way that we conduct the analysis is that we'll be, traditional cap and trade program that focuses on production won't capture all of the emissions reduction opportunities available for the sector, so we'll be looking at a broader cap and trade program, a cap on load that tries to capture the emissions associated with the power demand.

And this is also, you know, sort of a new area that we'll be getting into. We'll have to do a lot of digging. In addition to the technical analysis that Tellus will be doing, and some modifications to the NEMS model that will need to be made, we'll have to do some more qualitative assessments of how you would go about doing this. Because obviously there are a lot of issues in terms of tracking it and making it work.

And we also want to explore things beyond the power sector. There's an opportunity to combine a cap on load with some other industry sector options in terms of a multi-sector cap and trade program. And we'll be developing a way to do that, as well.

And we're going to be using NEMS as our tool to evaluate the sector. NEMS represents the generation, transmission and pricing of electricity subject to fuel prices, other generation costs, new plant prices and electricity demand characteristics.

Essentially NEMS will dispatch all of the units according to cost, the lowest cost first, including the environmental costs until the power sector demand is met.

And capacity additions are also determined within the model and are also reflecting any allowance prices, for example, that you might have.

So, limitations of the NEMS model. It's imperfect in the way it deals with technology innovation. You kind of have to know what the innovations are going to be and allow the model to use those assumptions going forward if you want to see if something is used. For example, a new generation technology. You'd have to put it in in the beginning. It won't come up with its own technology innovation.

Similarly on energy efficiency. It's conservative in the way energy efficiency is handled in response to changes in energy costs. So we will need to look at compensating for that in our energy efficiency scenarios that we'll be doing. There are other ways to do it, as well. And we can talk further about how we want to best compensate for those issues.

In both of those cases the model essentially over-estimates the emissions and potentially the costs of complying with different scenarios because not all the efficiency may be taken advantage of, unless we do some compensating.

And finally, the model does reflect the competitive power market. It doesn't address market power issues, et cetera.

We are planning to do five what I'm calling core model runs. One being the reference case, which we're going to try to get to be as close to what we think is business as usual, as possible.

Generally in a reference case you assume policies that have already been finalized, but not ones that are under discussion. And how we've usually done this is we've included, you know, mandatory policies; and we've also included policies that we think will come into place because they're funded. But not ones that aren't. But we can talk about that definition further, as

I get into the reference case in more detail.

We'll be doing an energy efficiency and renewable energy case, possibly two. One might be termed the more realistic scenario, what we all believe could really happen based on, you know, what's politically feasible, technologically feasible. You know, things like continuation to improvements in building code standards, that kind of thing. And more aggressive RPS, which is under discussion. Those are the kinds of things that you might put in a more realistic energy emissions renewable energy scenario. We may also want a more aggressive one that also -- to see how far you might be able to go with this sector.

The third core model run will be our cap on load, and we'll have to, of course, in all these cases, define exactly what we mean by these scenarios. And that's, you know, the work that's set out for us in the coming months.

But we'll probably want to look at more than one cap level, and those will be some of the sensitivity runs. We'll also want to do a cap on load that applies just to investor-owned utilities to look at what, you know, the Public Utilities Commission program might do, in terms of looking only at that portion of the sector to understand some of the distribution impacts that might result from that kind of scenario. And then as we talked before, a cap on power and industry combined.

We're planning some sensitivity runs --

MR. CAVANAGH: Before you --

MS. DAVIS: Um-hum.

MR. CAVANAGH: -- could you just bounce back?

MS. DAVIS: Yeah.

MR. CAVANAGH: My understanding from the discussion of the fourth bullet was that one of the things you were trying to capture there were the efficiency losses associated with just doing this on a partial basis.

MS. DAVIS: Right, you have some leakage, I'm sure. And we'll see how much that is.

MR. CAVANAGH: Okay.

MS. PULLING: And just to clarify, these model runs are going to be for electricity generated in California? Or for electricity sold? Is there --

MS. DAVIS: Well, --

MS. PULLING: Does it include, in other

words, out-of-state --

MS. DAVIS: All the model runs will show the results for the entire region. And we can break it out in different ways. We'll want to devise a way to break it out so that we can compare with a cap on load scenario, understanding how much of the energy and emissions produced are associated with demand.

We'll also be able to break it out based on just California and then for the whole region. So there are different ways --

MR. CAVANAGH: But in every case you're looking at California load, right, as the driver?

MS. DAVIS: Well, in the cap on load scenario, yes. But --

MS. PULLING: Well, what about the --

MR. CAVANAGH: The cap on emissions --

MS. PULLING: -- the reference case, for example? That's --

MS. DAVIS: Well, the reference case, you know, we'll have reported results right now for California and for the region. We still need to devise the way to show the emissions associated with the California demand.

And I'm not going to be showing you that today, but we will need to do that to make it comparable with all the other scenarios in the reporting.

MS. PULLING: Maybe I'm being dense, I'm not -- or maybe I'm not explaining this well enough. When you say you're going to show California and the region. When you show California, are you showing California as only what's generated in California? Or are you showing California as what's generated here plus what's imported to serve load here?

MS. DAVIS: Today I'm only showing you what's generated here, and then what's generated in the region. But --

MS. PULLING: You will be able to --

MS. DAVIS: But we have --

MS. PULLING: -- show it how it really is?

MS. DAVIS: -- we will be showing it how it really is.

MS. PULLING: Right.

MS. DAVIS: So that we can --

MS. PULLING: Because otherwise you're missing --

MS. DAVIS: So that we can compare it

with all the other scenarios. But I don't have that yet today.

MS. PULLING: Okay, okay, good. Because otherwise you're missing a chunk of greenhouse gas emissions.

MS. DAVIS: Right. And we'll --

MS. PULLING: Yeah.

MS. DAVIS: -- be reporting the emissions associated with California demand. We just haven't devised the method to do it yet.

MS. PULLING: Okay, thank you.

MS. DAVIS: Um-hum.

MR. HERTEL: Stacey, I'm sorry, but you already disarmed this question, I think, but your -- that cap on load -- maybe it's just the way I read this as being a utility person, but that sounds as though what you want to do is restrict consumption?

MS. DAVIS: We're restricting emissions associated with consumption.

MR. HERTEL: You might want to pick a --

MS. DAVIS: And that was a shorthand that we've been using, but we --

UNIDENTIFIED SPEAKER: -- load-serving entity cap --

(Parties speaking simultaneously.)

MR. HERTEL: I'm just saying that maybe you want to pick a more aesthetic term.

(Laughter.)

MS. DAVIS: We're open to any suggestions you might have for naming that run.

MR. HERTEL: I would be shot if I made some, so I won't.

(Laughter.)

MS. DAVIS: So some of the sensitivity runs we'll be looking at, a low hydro year case, that was say 25 percent lower; we have to divide the actual amount, and it may not be the same across all facilities. We'll be working with CEC folks to get those specific exceptions.

We'll also be looking at a climate change scenario as was discussed in our call a couple weeks ago that assumes a lower hydro availability combined with higher, you know, summer heating -- or summer cooling costs. And therefore the differences in demand.

We'll be looking at caps on load combined with offset so that you can see how offsets would affect the cost of complying with different cap levels --

MR. CAVANAGH: It's a cap on emissions associated with load?

MS. DAVIS: Correct.

MR. CAVANAGH: Okay. Well, he's right -- don't -- no shorthand.

(Laughter.)

MR. CAVANAGH: Bad idea.

UNIDENTIFIED SPEAKER: No, it's true.

MR. CAVANAGH: Yeah.

UNIDENTIFIED SPEAKER: Yeah, that's true.

MS. DAVIS: And we'll be looking at different cap levels for that cap on emissions associated with demand. And one would be based on intensity goals that we would determine offline and use that as one scenario. And we'll be looking at other scenarios, as well.

We will also be doing some offline analyses, things that don't really require modeling, but to understand the effects of an offset program without a cap, for example. And to look at how to do a cap on load and how that compares with an emissions portfolio standard. Another measure that can be used to reduce emissions from out-of-state power.

So, I'll be showing today the results of our preliminary reference case. It's preliminary largely because we haven't given folks in the power sector group enough time to really think about some of the assumptions. We've made a presentation of them and it was a lot of information. And I think we all need some more time to look over those assumptions and feel comfortable with them.

So, this is our first cut at it. And we're still, as I mentioned, looking for input from everyone, as well as from the power sector folks specifically. And, yeah, that's it.

So, some of the important assumptions that go into this run that I'll be presenting. The first key one is power demand. And we agreed that we would use CEC projections for power demand. And I'll say, first off, that those projections do differ quite a bit from the EIA AEO 2005 numbers as run by Tellus.

And specifically the growth rate for the EIA business as usual is quite a bit higher, more than double the growth rate shown for CEC. But interestingly, in the earlier years the demand levels are lower; in the later years demand levels are quite a bit higher. So that's going to color what I show later, the differences between the EIA AEO 2005 reference case versus the new reference case that we're running. That's one of the important changes.

We did take that CEC set of projections and reduced it --

MR. LAZARUS: I'm sorry to interrupt but I just wanted to toss out one clarification lest you be confused with the numbers you saw this morning.

When you've been referring to the numbers that Tellus has provided, we are working with CCAP, running the NEMS model. The NEMS model comes with a set of assumptions that come from the Department of Energy.

And so as Stacey and the rest of the CCAP team inform how they are changed, those will be changed. But when you say the Tellus numbers, just so you're not confused, the numbers you saw this morning that I presented and Ned has been presenting about California-specific growth in electricity emissions and electricity, those are based on the same CEC IEPR forecasts.

So just to clarify, you're just

referring to these runs --

MS. DAVIS: Correct.

MR. LAZARUS: -- new runs of the NEMS model. Just so people aren't --

MS. DAVIS: Thank you. We reduced the CEC assumptions by -- they already included the public goods charges. We reduced it further to include the CPUC energy savings goals just from the period 2005 to 2008. Those would be years where there's money already being committed.

We didn't reduce it for the later years and that's something that we can discuss, whether those later year goals should also be included in the reference case. And generally, if it's something, the goal, there's no money, we would not necessarily put it in, but I think that's something that's open for discussion.

And whether there are any other measures that wouldn't have been included in the reference case that needed to be added.

And then I should also, to make this a little bit more complicated, Tellus doesn't actually put in those demand numbers. As we provided, they have to sort of iterate with the model to try to back into them, in order to allow the model to continue to have iterative effects that's needed in order to respond to changes in policy.

So, the actual numbers that were run don't quite match the numbers you gave them. They were actually a little bit more optimistic on energy efficiency than we were.

MR. CAVANAGH: Although, as far as I know, the PUC energy savings goals go out ten years, not four.

MS. DAVIS: To 2014 or '13 or '14.

MR. CAVANAGH: Right.

MS. DAVIS: Um-hum.

MR. CAVANAGH: So your point is they just haven't approved the funding?

MS. DAVIS: Correct.

MR. CAVANAGH: But they've established the targets.

MS. DAVIS: So I guess that's a question for you, how sure a thing is it that those will be achieved.

MR. CAVANAGH: It's a sure thing.

(Laughter.)

(Parties speaking simultaneously.)

MR. CAVANAGH: I think every PUC

Commissioner would tell you that they're committed to this. And it's the loading order adopted by the state, this is the policy of the State of California. This is no acceleration, remember. This is simply meeting the commitments that the PUC and the Energy Commission together have already made.

MS. DAVIS: The other people think that's a safe, reasonable assumption?

MS. PULLING: Well, it's helpful to have it be in synch with the PUC's long-term planning horizon, which the three IOUs are living under, which is 2014, the ten-year time period. So I think --

MR. HERTEL: You can do it both ways. It's just a matter of arithmetic.

MS. PULLING: Yeah, but I mean there's been a lot of modeling done and a lot of projections done around from now to 2014. So I think it's helpful to have your modeling synch up with that time horizon and then, you know, I would tend to agree with Ralph that the --

MS. DAVIS: So you're not going to get any extra credit for those measures, they're already in place. We all feel confident that they'll be achieved?

MS. PULLING: I don't know what you mean by extra credit.

MS. DAVIS: Well, if you include it in, for example, the energy efficiency scenario you'll see the additional reductions from that, plus some other additional measures against the reference case.

It's just a different way of viewing the results.

MR. HERTEL: But wouldn't the ultimate effect be that assuming you take those into account, that means that in effect they're unavailable for further reductions from that sector?

MS. DAVIS: No, you can still go beyond. You can always set more aggressive --

MR. HERTEL: Well, no, --

MS. DAVIS: -- goals for --

MR. HERTEL: -- I know. But those that you already take advantage of are in the bank, so to speak, --

MS. DAVIS: Yes, correct.

MR. HERTEL: -- and to do more presumably those will be marginally more expensive to get at.

MS. DAVIS: Um-hum. Presumably.

MS. PULLING: But it's helpful to have the modeling show --

MR. HERTEL: Oh, absolutely.

MS. PULLING: -- how much is already being done, planned to be done --

MR. HERTEL: Yeah, and I think if you just did it in a two-step fashion, show what's already been done, show what's going to be done between now and 2014, and then think abut what more can be done beyond that.

MS. DAVIS: Okay. All right, we will amend our assumption accordingly.

MR. CAVANAGH: But you can only do so for the IOUs, regrettably --

MS. DAVIS: Right.

MR. CAVANAGH: -- at this point. I mean the public power sector has not yet responded.

MS. DAVIS: Um-hum.

MS. PULLING: Right, this is relevant to your IOU modeling, but not the others.

MS. DAVIS: Okay, --

MR. CAVANAGH: Yes, and I think in general you're going to put the level of effort right now in the public power side's about half the IOU level of effort in terms of savings delivered as a fraction of system load. And this analysis should show that.

MS. DAVIS: All right. Another assumption that we looked at was fuel prices, particularly natural gas prices. And we wanted to look at -- we decided to use the AEO 2005 fuel price numbers since they were updated more recently. They were higher than what CEC had given us. We thought they were more realistic, given today's gas prices.

And this is another assumption that isn't directly put into the model that Tellus basically has to iterate in order to try to match it up. And they did a pretty good job in this case for the years that we're looking at, especially 2010 to 2025. I'll show it in a later slide; the numbers are quite close.

In terms of transmission these transmission assumptions reflect some changes from what was shown on the call earlier. From Mexico we decided to use the CEC assumption. For the southwest and the northwest we went with the ISO, the California ISO numbers, which were, particularly for the southwest, roughly in the middle of where CEC and EIA 2005 was.

So that's another important assumption reflecting a difference from AEO 2005, we're going to be seeing more transmission potential from that southwest region where there is, you know, coal generation coming into the state.

MR. HERTEL: One thing that you might also think about is transmission within the state, particularly in our ability to utilize additional amounts of renewable resources. Currently we are definitely very transmission constrained. For example, with respect to wind power.

MR. CAVANAGH: But heroic efforts.

MR. HERTEL: Heroic efforts are being made, some of which, Ralph, you might want to know, are even being made by those present.

MR. CAVANAGH: I'm well aware of it.

(Laughter.)

MR. CAVANAGH: Just giving you a chance to bring it up.

MR. HERTEL: The chicken-and-egg problem.

MS. DAVIS: So we think that these California ISO numbers reflect a pretty good starting point to reflect where we are today.

MR. HERTEL: I think so.

MS. DAVIS: But we might want to think about whether this is realistic for the basecase, reference case, throughout the period that we're looking at, or whether we need to assume some higher numbers in later years.

MR. HERTEL: Do these include, for example, the second Devers-Palo Verde line?

MS. DAVIS: I'd have to check on that.

MR. HERTEL: Well, check on that, because if you're asking about increases to the southwest, certainly that's one that's on the drawing boards.

MR. CAVANAGH: It is, but, Mike, the northwest, that's a huge, that's a big -- I think the current --

MR. HERTEL: No, southwest.

MR. CAVANAGH: Yeah, but where's the -- 9.8 gigawatts for the northwest. The whole --

MR. HERTEL: Capability.

MR. CAVANAGH: The whole system is 7.8 now.

MR. HERTEL: Yeah, I know.

MR. CAVANAGH: You picked up 2000

megawatts.

MR. HERTEL: Wendy, do you know?

MS. DAVIS: -- the ISO, but they only differed by, you know, decimal points with the CEC and the EIA.

MR. BEEBE: It could be the difference between the ISO number and the (inaudible) Western and SMUD --

MS. PULLING: Maybe they're defining the northwest as --

MR. CAVANAGH: Oh, yeah, the Pacific Intertie, which is -- just to be clear, the Pacific Intertie, which is mostly what people think of when they hear the northwest, it's --

MS. PULLING: Yeah, I think they must be looking at northwest as Nevada and --

MR. HERTEL: Well, anyway, the numbers ought to be checked.

MS. PULLING: Anything that's not Arizona.

(Parties speaking simultaneously.)

MS. DAVIS: And this had to be -- it wasn't as an exact science as we'd wanted because the regions are defined slightly differently between the NEMS model --

MR. HERTEL: Yeah.
MS. PULLING: Yeah.
MS. DAVIS: -- and the state. The top little chunk of California is lopped off.
MR. HERTEL: Ralph's point is well taken, though. You might want to just check those numbers to be sure, because that's a big difference.
MS. DAVIS: Well, we've talked about them, both with the CEC experts and the California ISO. But if there are other people we should talk to, give us names.
In terms of hydropower availability we decided to match the EIA numbers with CEC. So basically we reduced the availability of some of the hydro capacities, specifically the must-run hydro capacity so that those would be closer.
The terms of existing plant capacity, we had shown that there were some bigger differences than we would have imagined between the EIA and the CEC assumptions, particularly for coal and gas and renewables.
We were able to bridge those gaps quite a bit by looking at planned capacity. And EIA assumes a lot of planned capacity; CEC did not in

their assumptions. Also CEC looks only at dependable capacity, whereas EIA has it all in there. Presumably there are capacity factors that limit how much can actually come in.

So we were able to bridge the gaps a lot, but there are still for natural gas the difference of 5.5 gigawatts, which is nothing. So that's an area that we could work in further if people think it's worth digging into specific units to understand really what the differences are.

On new plant construction we decided to use the AEO 2005 assumptions on the performance and cost for new plants. That's what's used by the model to determine what's economically going to come in.

And then finally for renewable energy we plugged in the RPS as it now stands.

MS. PULLING: And are you assuming the use of RECs? I assume you were.

MS. DAVIS: Not featured in the model. I don't -- would that have an impact?

MS. PULLING: It could.

MS. DAVIS: So, for some of the results, and this is just a first look at the results, and we'll be slicing and dicing it in different ways in the coming weeks. And we'll be sharing this with you.

But just to give you a sense as to what's happening in our current preliminary reference case, this graph shows the new builds. Essentially both the planned and the unplanned builds. The planned ones are the ones that EIA had decided to lock into the model. And the unplanned ones are the ones that came in economically in the different years, 2010 and 2020.

MR. HERTEL: Excuse me, could you repeat that on unplanned? What's the criteria?

MS. DAVIS: Unplanned are units that come in on an economic basis because more power is needed to meet demand, and it hasn't already been put into the model.

So, there is some coal steam coming in on an economic basis to meet demand. There wasn't any that was planned, but it looks like there would be some coming on an economic basis.

Natural gas combined cycle, you have a lot of planned, and also some unplanned coming in in both years. These are cumulative numbers, by the way, so you don't add up 2010, 2020. It's all in the 2020 number.

MR. CAVANAGH: Do you retire anything?

MS. DAVIS: There were some retirements. It shows on the bottom, 4.77 gigawatts are retired in 2010, and just 6.5 in 2020. Most --

MR. CAVANAGH: Do you know what you -- have you broken down how it --

MS. DAVIS: Other fossil steam, so that category probably gas and oil steam units, you know, probably the older inefficient ones. And a lot of that happens before 2010.

MR. CAVANAGH: So you don't retire any coal, specifically --

MS. DAVIS: No, it was like .1. I mean there was a really small amount.

MR. CAVANAGH: I see.

MR. HERTEL: That's ours, Ralph.

MR. CAVANAGH: Well, it needs to be a little bigger then.

(Laughter.)

MR. CAVANAGH: -- be 1.2.

MR. HERTEL: 1500 megawatts are going out at the end of the year.

MR. CAVANAGH: This is a good -- he

makes an important point. He's quite serious. The Mojave plant goes out of service at the end of the year for an undetermined --

UNIDENTIFIED SPEAKER: Look serious.

MR. HERTEL: I thought I looked serious.

MR. CAVANAGH: Well, but -- were you making an announcement today of somewhat greater significance, which is to stay off then forever?

MR. HERTEL: No. I mean obviously the plant will not continue to operate past 1/1/2006 until and unless fuel, water and emissions control problems are resolved. Which, at present, look problematic.

MS. DAVIS: So are you suggesting that we force this outage or --

MR. CAVANAGH: What should she do?

MR. HERTEL: Well, I wouldn't count it past 2005 for at least another couple of years. It's going to be out --

MR. CAVANAGH: But this is 2010 and 2020. What do you want her to do?

MS. PULLING: What did you assume in your portfolio, in your long-term plan? Did you assume --

MR. HERTEL: It's not there.

MS. PULLING: So, see, you may know this already, but the three IOUs all file long-term plans with the PUC, and did a whole lot of modeling with a whole lot of different assumptions. And so --

MR. HERTEL: Yeah, those would be good to look at.

MS. PULLING: -- Edison didn't assume it for the 2004 to 2014 window. So, again, back to this idea if you can have your models reflect that time horizon, you can at least see some of the assumptions that we've already put together.

MR. HERTEL: Um-hum.

MS. DAVIS: Okay.

MS. PULLING: And so it also helps synch up a little bit with the whole long-term planning effort. Which isn't to say you have to accept all of our assumptions, but --

MS. DUXBURY: It's a little reality check, a comparison --

MS. PULLING: It's definitely a reality check; it reflects all three IOUs' plans, or supposed to reflect the loading order that Ralph talked about. So there's just a lot of work there that you might be able to borrow from.

MS. DAVIS: Okay. Yeah, we're happy to look at that and see how it matches what actually is assumed by EIA in terms of new builds and I don't know that they assume retirements. I think these all came in economically. But I --

MR. CAVANAGH: And what do you want to do --

MS. PULLING: Well, I think our assumptions are probably more detailed than EIA's.

MS. DAVIS: Um-hum.

MR. CAVANAGH: Wendy, what should she do with the nuclear plants? Just extend them?

MS. PULLING: In ours, in PG&E's --

MR. HERTEL: Well, they're in till --

MS. PULLING: -- for Diablo Canyon we did assume continued operation with upgraded steam.

MR. HERTEL: Yeah, but they --

MR. CAVANAGH: And so did Edison --

MR. HERTEL: -- they go -- Ralph, they go to, even if you didn't do the steam generators at SONGS at least, you'd still operate till 2023. So it's well within this block.

MR. CAVANAGH: Yeah, good.

MS. DAVIS: The modeling right now --

MR. HERTEL: And I don't know what Diablo is like, but I assume it would be the same case.

MS. PULLING: Yeah, we assumed it's online through --

MS. DAVIS: The modeling right now shows no change in generation; it's pretty consistent throughout the period, as this shows.

The second to top shaded area is the nuclear generation. And you see it starts and ends at the same place.

Areas of growth appear to be coal and renewables. And gas seems to grow a little bit initially, and then maybe loses out to some renewables and coal in the later years.

MR. HERTEL: Stacey, on renewables, you're assuming again 20 percent by 2017?

MS. DAVIS: Um-hum.

MS. PULLING: Does renewable there count large hydro?

MS. DAVIS: Yes.

MR. HERTEL: No. It does?

MS. DAVIS: Yes.

MS. PULLING: Okay, so that's -- you might want to just clarify that as you go forward.

That is --

MR. HERTEL: Yeah, because that --

MS. PULLING: -- the State of California that's not defined as --

MR. HERTEL: That's not our understanding. And then --

MS. PULLING: Well, it's not the law.

MR. HERTEL: -- secondly, --

(Laughter.)

COMMISSIONER BOYD: It's not the law --

MS. PULLING: It's not the law -- you can understand it however you want.

(Parties speaking simultaneously.)

(Laughter.)

MS. DAVIS: Would it be helpful for us to break those numbers out if we can?

MR. HERTEL: Yeah, it would. It would.

MS. PULLING: I think so.

MS. DAVIS: Large hydro versus other renewables.

MS. PULLING: I think so.

MR. HERTEL: And also, did you look at intermittency as you reach the 20 percent penetration level?

MS. DAVIS: I think each plant -- would

have a capacity factor assumption probably of 30 or 40 percent. So, --

MR. HERTEL: The reason I bring that up is there's been some work in Germany which is heavily developed wind generation in the north, in particular. It tends to show that as you approach the 20 percent penetration level, the benefits from renewables drop off dramatically because the intermittency factor gets very high. And as a consequence you have to build back-up fossil to supply the gap.

I imagine people at CEC would be aware of that.

MS. DAVIS: I'm not sure how the model would measure reliability issues, or the issues --

MR. HERTEL: It may not even be there, and it might be worth, you know, a look and maybe a footnote or something like that, that would -- because I think the policy discussion will be let's go farther faster on renewables. Which is a good policy discussion to have.

The only thing that you need to be aware of is that the gains we've achieved so far probably can't be sustained due to the intermittency and fossil back-up factors.

MR. LAZARUS: NEMS will build fossil back-up for, I don't know how closely it deals with --

MR. HERTEL: Yeah.

MR. LAZARUS: -- the time issue of intermittency with the wind resources --

MR. HERTEL: Right.

MR. LAZARUS: -- and the diversity of where the wind resources are. I don't think it's that sharp on that. But it does --

MR. HERTEL: It does fill back in?

MR. LAZARUS: -- as you get up toward between 10 and 20 percent, the amount of -- my understanding from -- the person who's doing most of the work at Tellus is Allison Bailey, is that NEMS will build more and more fossil back-up as you increase the penetration --

MR. HERTEL: I'd be real interested in what happens beyond 20 percent because I don't know what the function looks like. I don't think it's a smooth curve.

MR. LAZARUS: Right.

MR. HERTEL: I think it's an almost a step function. And my understanding was that you do pretty well up to about 20 percent, and then once you go beyond that it really drops dramatically in terms of the benefit that you get.

MR. LAZARUS: Pacific -- has done some studies on that, too.

MR. HERTEL: Yeah, they have.

MR. BEEBE: Michael, would it help if they did some granularities, put in some different renewable types?

MR. CAVANAGH: Why don't you have an intermittent line, a non-intermittent line and a big hydro line?

MR. HERTEL: It's just a question of how much loss of back-up you build.

MR. CAVANAGH: But you only need that for intermittent. A lot of our renewables aren't intermittent.

UNIDENTIFIED SPEAKER: Yeah, --

MR. HERTEL: Well, that's true, --

MS. PULLING: Geothermal.

MR. HERTEL: -- but on the margin --

(Parties speaking simultaneously.)

MR. HERTEL: -- on the margin, Ralph, I think we're going to build wind --

MR. CAVANAGH: And geothermal. I bet you we build a good deal of geothermal.

MR. HERTEL: Well, you should check the projections.

MR. CAVANAGH: Okay.

MR. HERTEL: I'm not an expert, but I think this --

MR. CAVANAGH: John (inaudible) promised me 2000 megawatts, Salton Sea.

MR. HERTEL: Well, we need a lot more than that. And I suspect that is going to be out-weighed a lot by the wind development.

MR. CAVANAGH: Okay.

MS. DAVIS: Those are good suggestions. We'll look more into how this model captures the intermittency. And we'll be able to see for ourselves in our energy efficiency/renewable energy -- how the higher penetration is captured.

MR. HERTEL: Just a phenomenon we need to be aware of.

MS. DAVIS: And I agree that we'll try to break out the types of renewables a little bit more, and we'll talk with Tellus about that.

Natural gas prices, as I mentioned in the later years, 2010 and on, Tellus was able to pretty closely match natural gas prices with the AEO 2005 assumptions. But in some of the earlier years there is a bigger gap. We can try to bridge that more, I'm not sure whether --

MR. HERTEL: I assume that's MCF from the vertical scale?

MS. DAVIS: Yeah. Sorry about that. Electricity prices. Looks like the preliminary reference case does have some high electricity prices in the earlier years, largely due to the higher demand and the lower hydro coming in. So you have to meet your greater demand with more expensive power.

In the later years, you know, as more renewables come in, you know, it looks like, you know, the prices come down a little bit compared to the AEO assumptions.

MR. HERTEL: Could you also provide a display of electricity prices in the neighboring states?

MS. DAVIS: I think this is regional. But I can break it out.

MR. HERTEL: Yeah, I'd love to see it broke down.

MR. CAVANAGH: No, no, that's California.

MR. HERTEL: That's pretty high.

MR. CAVANAGH: Yeah.
MR. HERTEL: You would think that would be California.
MS. DAVIS: Okay, it may be.
MR. HERTEL: Because I'm sure that Washington and Oregon are right about 5.5 --
MR. CAVANAGH: No, they're up some, Mike.
MR. HERTEL: -- 6.5 maybe.
MR. CAVANAGH: They took a hit. They're over 7 now.
MR. HERTEL: Are they?
MR. CAVANAGH: Yeah. They blame you.
MR. HERTEL: Nevada is what, about 9.5?
MS. PULLING: Yeah, you and your hot tub.
MS. DAVIS: And then finally how it all breaks down into CO_2 emissions. In the black again is the preliminary reference case. And the CO_2 emissions are higher in the earlier years, less hydro, more demand, more coal coming in from potentially southwest.
In the later years, as more real energy comes in, more energy efficiency, I was surprised at how much it's lower than what the reference

case showed. But, again, this is just California. And for the region, as a whole, it's more like what you would expect.

You know, there is an effect that the RPS and the energy efficiency in California has on the region as a whole, as well. But emissions are still growing across the region, but by not as much.

So that's what the reference case looks like at this point.

MR. BEEBE: Do you run numbers in your model if you -- these values versus GDP as an intensity?

MS. DAVIS: I'm not sure if GDP is now, but some kind of system cost number I'm sure is in the model. But they didn't have it for us today.

MR. HERTEL: I'd be surprised if it spits that out.

MS. DAVIS: And we can certainly take state projections or something, but it wouldn't reflect what's happening in the model, to show the data.

There's definitely a lot more in there that we can dig out, and a lot more ways to split it out, you know, by state, by region and by fuel type.

MR. BEEBE: Well, I see this as a bipartisan commission now has GDP as an intensity measure and --

(Parties speaking simultaneously.)

MR. BEEBE: -- you know, people are using these intensity things. So if we want portability of California's numbers for reference in other areas, this might be a help.

MS. DAVIS: And we can certainly do it making assumptions that GDP won't change unless we have the economy-wide modeling at the end of this process, we'll be able to have a better handle on that. So we can combine this with that answer, and give you a number.

So our next steps, we have a lot of work cut out for us. And for you. We first want to finalize the reference case and we'll take all the suggestions you've given me here. And probably have another call with the power sector workgroup to discuss, you know, what we recommend as a final reference case parameters. And move forward with that.

We'll be looking to design energy efficiency renewable energy scenarios soon thereafter. The low hydro and other sensitivity cases that we can do off the baseline would come next.

And we expect that the NEMS model will be updated to be able to do the cap on load, and, you know, allow the power generators to make a decision where to sell their power, to the California market or not sometime in April or May. So there will be a little bit of a lag before we can start those runs. But, --

MR. CAVANAGH: Why do you need a low hydro year scenario? Your concern is average emissions, right? I mean what difference does it make what happens in a low hydro year?

MS. DAVIS: It'll look at the higher cost of meeting a given control scenario.

MR. HELME: -- this driven by the climate change effects, the desire to --

MS. DAVIS: Well, that was driven actually by the CEC. They were concerned that hydropower availability has a big effect on their results, and they wanted to see what effect it would have on ours.

MR. CAVANAGH: Okay.

MS. DAVIS: So that's where that came

from. And we do expect that as CEC comes up with some other projections that may not match what we're doing, we may do some sensitivities off the reference case to understand those differences.

MS. PULLING: Does the climate change scenario -- my understanding from our last meeting and the presentation then was that some of those, that the models that UCS and others did, forecast on the ground, if you will, effects in California 50, 80 years out.

So how do you incorporate that into -- isn't the --

MS. DAVIS: We'd only be able to look through 2025, so anything that they can say is out there between now and then we can build in in terms of hydro capacity and power demand.

MS. PULLING: Um-hum.

MS. DAVIS: That's it. Any other questions?

UNIDENTIFIED SPEAKER: Thanks very much.

(Applause.)

COMMISSIONER BOYD: Well, there are several questions on the table, obviously, for folks to look at. I've got a few listed for myself, but not to take your time I'll pursue them with CCAP.

MR. HERTEL: We're interested in your questions.

COMMISSIONER BOYD: Well, the 2017 versus the policy of 2010 on --

MR. HERTEL: Yeah. No, I think that's a good one --

COMMISSIONER BOYD: -- on the renewables is a question that's going to be a little hard, I think, for the CEC to accept the 2017 when we and the PUC are publicly saying the policy, notwithstanding the law, --

MR. HERTEL: Yeah.

COMMISSIONER BOYD: -- is 2010.

MR. HERTEL: But at least you ought to have that sensitivity in there to see what the effect would be, right?

COMMISSIONER BOYD: Right. And there's a question about no DG in these tables that interests me, or concerns me, frankly, as one who frankly likes the idea of some DG.

MR. CAVANAGH: Well, Jim, for greenhouse gas purposes, does it matter? I mean the --

COMMISSIONER BOYD: That's a good question. That's why I may be not too worried about it, in terms of bigger things to worry about.

MR. HERTEL: Control Z, quickly.

(Laughter.)

(Parties speaking simultaneously.)

COMMISSIONER BOYD: Okay, I think it's time for what, public comment? Is there anybody in the audience who would like to ask any additional questions or has anything they'd like to say on this general subject? And anyone on the phone. I see a hand in the audience, though, so. Louis.

MR. BLUMBERG: Yes, thank you. I'm Louis Blumberg with the Nature Conservancy. I just wanted to underscore something that Diane Wittenberg said earlier about the importance of sequestration, including that into the analysis and the consideration for the report.

California has 17 million acres of productive timberland that includes important redwood land. And I think this is a unique opportunity. The Registry has already gone ahead and adopted protocols for the forest sector, and that provides an opportunity to really create some analysis on offset potentials.

Also I think incorporating forests into the report might help you with public education in terms of the cachet that redwood forests have. One carbon deal that was struck with a European buyer was consummated on the fact that the buyer was interested in California redwood, because that was the tree species that they wanted to be involved with.

So I would urge you to look at that further as you go through the process. I'm not sure if it's something that CCAP would do, or that the subcommittee group. I know that the agricultural/forestry subcommittee is not made yet, but I would encourage that at some point in the process in the not-too-distant future that you incorporate some consideration of that.

Thank you.

COMMISSIONER BOYD: Thank you, Louis. Yes. Doug.

MR. WICKIZER: Thank you. Doug Wickizer, California Department of Forestry and Fire Protection. You just about hear all about the fires and the trees and the fires all at once.

What Louis stressed was the redwood forests, but I think something I noted a lack of today was not only much discussion of the co-benefits, but the actual cost per ton of carbon dioxide, either reduced or stored.

And certainly today's discussions have been mostly on efficiencies, not on the other ways of dealing with emission reductions, which is storage.

I think that we're at the point with the forest protocols -- which we participated in, I do want to stress that -- of trying to work forward and have demonstration projects on the ground.

Some of that effort will be in combination with the western partnership on carbon sequestration sponsored by the Energy Commission and DOE. And that there's going to be a 40-year set of demonstrations set out.

Now that may be of some value to this group in the future, just to see how that blends in with any type of storage strategy which may include. Other than that, we are also pursuing our own demonstration projects just to see if there is a market for carbon.

And the last thing, I'm certain that you've been well aware of the amount of emissions from wildfires over the last few years. The investment that we're putting in that area, as a department, is fuels treatment.

In the reduction of fuels treatment we're looking to use not only -- not to just chip and lie on the ground. But we're also trying to work in conjunction with the renewables efforts that are going on to start to produce some of the distributed generation Commissioner Boyd has mentioned, and some of the un-intermittent renewables that can be produced with a sustainable resource.

There's two benefits to that. One is energy production net zero on carbon emissions. And finally, a reduction in the acres burned, which is a direct correlation to emissions from that source in California.

COMMISSIONER BOYD: Thanks, Doug. I think when the Committee meets, I was thinking earlier today, at our very first meeting we kind of really shot-gunned you with tons of information about various activities underway at the state level, including all the research projects at the Energy Commission, or other projects.

Probably need to re-feed some of that back into the individual committees, just as a reminder of some of the activities that are going on to help those subcommittees with their deliberations. But I'll work with Susan and see that the staff is there to help the subcommittees with that.

There's a lot going on. I mean we're spending all kinds of money on digesters and that kind of work in the state. Biomass is cycling back again. This Administration now wants an initiative on biomass, which is near and dear to my heart. So we're going to fire that effort up yet again.

And so there's a lot of other activities that will tie into this. And Louis and Doug just brought up a couple of the areas that we've not talked about today. But we had a lot on the plate today.

Other questions, comments? Anyone out there on the telephone left who has a question or a comment? I won't ask if there's anyone even left on the telephone.

(Laughter.)

UNIDENTIFIED SPEAKER: Yeah, we're still here.

COMMISSIONER BOYD: Oh, okay, very good.

Thank you.

Okay, well, seeing no more hands, Susan, we'll turn it back over to you for kind of the last slide and a little talk about where we go.

MS. BROWN: Well, we're having trouble getting that last slide back up. I think I have it memorized, and you have it in your handouts, if you'll bear with me.

I thought it was appropriate we talk about next steps at this point. And I first want to explain that the transportation sector analysis was not done in time for this meeting, so I apologize to Jason and Michael and Abby and some of the -- and Ben and some of the others that are more interested in those issues because of your background and expertise.

So we'll be presenting those probably in draft to you via conference call. And I'll certainly make sure that the entire group is aware of any future conference calls that we have, so if you choose to participate as Advisory Committee members, you can.

A number of next steps. I do have a schedule from the Center for Clean Air Policy, which incorporates the power sector modeling that

Stacey discussed with us in depth. And really what we're talking about is analytical results not being available till part of it will be in April and part of it will be in July. Which then begs the question that Abby raised earlier about considering extending our schedule until at least in the fall, if you want the benefit of the analysis that CCAP is doing for us. But realistically we're not going to be done by July.

We have some contractual issues we have to deal with, and some funding issues, which are now being resolved so we can, you know, move forward full speed ahead. And I promise you that the next meeting will be as substantive as this one was in terms of analytical results. So that's one thing I think we do need to decide.

My recommendation is that we hold another meeting in April. Again, that's consistent with the schedule that Ned is providing me, when results can be finalized for presentation to the entire group.

COMMISSIONER BOYD: Is that early April or late April?

MS. BROWN: Ned?

UNIDENTIFIED SPEAKER: Early April.

COMMISSIONER BOYD: Early April, good.

MS. BROWN: He has a date in mind, I think. And also again in July. Again, that's consistent with the workplan that I have that Ned and I have been working on. So we're going to finalize that plan and get it out to folks.

And then I will be scheduling conference calls. And my recommendation is we sort of stick with the subcommittee breakout that we had before, you know, power, transportation, ag, industrial have kind of been merged because of analytical, as you saw today, the way they categorize the work.

And that, again, all the members be allowed the opportunity to participate in any and all of those calls. So, that's what I plan to do. And again, Ned and I are going to work out a schedule in the next day or so.

MS. CORY: Susan, on that, can we bring in other people into those conference calls?

MS. BROWN: Absolutely. I know we've allowed that absolutely. If you have staff or other colleagues that you think would be, you know, want to weigh in, absolutely.

MS. CORY: Is cement going to be with us?

MS. BROWN: I think that was a suggestion I heard. I actually -- where's Diane? I actually got from the Registry some good recommendations on people in the cement industry that we have been talking to, that I gave to Ned's staff. So I guess that's a question for Mr. Chairman whether we want to add officially or just bring them in.

COMMISSIONER BOYD: Well, two issues went on the table today, both petroleum and cement, that are rattling around in my mind. It's a very valid point that Abby made awhile ago, about talking about people who aren't here at the table.

Now, Denise does a wonderful job of representing the entire petroleum industry --

(Laughter.)

COMMISSIONER BOYD: -- as Cynthia does for the entire agricultural industry.

MS. CORY: Yeah, right.

COMMISSIONER BOYD: But the cement industry is definitely not at the table. And maybe a broader based petroleum representative might be desirable.

MS. BROWN: Which we did pursue doing

offline, right, and we were not successful in getting that entity involved. But I think there are ways. We can certainly pursue that further.

So if that's the direction of the group we'll pursue that. Getting broader representation by the petroleum industry and representation by the cement industry, either formally or informally, in the meetings, so --

COMMISSIONER BOYD: Well, by all means informally, if not formally. But if we're really --

MR. CAVANAGH: Well, the cement industry has a pretty good trade association in Sacramento. That's CLECA.

COMMISSIONER BOYD: Right.

MR. CAVANAGH: Basically.

MS. BROWN: That might be the name that I have, Ralph. I'll have to check with --

MR. CAVANAGH: Yeah, so call Delaney Hunter.

MS. BROWN: -- Joel Schwartz.

MR. CAVANAGH: Call Delaney.

MS. BROWN: Okay. Will do. Okay, so the other question that Ned and I were talking about offline is whether we need more time than a day for the next meeting. Do you have an opinion on that, Ned? Do you want to weigh in here?

MR. HELME: I think --

MS. BROWN: I've worn you out today, I know, but is it too much?

(Parties speaking simultaneously.)

MR. HELME: I gave the example today, you know, presented a lot of material; there wasn't enough time to have your feedback to us beyond the question part.

MR. CAVANAGH: Except for Hertel.

MS. BROWN: And Ralph -- and Ralph.

MR. HELME: It might be useful to have more time for you all (inaudible) some of these options, give us some more feedback. But that's up to you.

MS. BROWN: Yeah. I mean we can do a lot through conference calls and individual contacts.

COMMISSIONER BOYD: Adding an hour to this meeting may not help some of us chew much.

(Laughter.)

COMMISSIONER BOYD: Of giving you any real feedback versus really thinking about it a little bit, but -- so was that bringing up the subject of next meeting site? Or am I getting ahead of the --

MS. BROWN: Yes, I think so. We've had some discussion about southern California. We've also had discussion about moving it back to Sacramento, especially for Ms. Schori, who has twice had to come and leave early to go to her board meeting or other policy committee meetings at SMUD, but --

MR. CAVANAGH: She has a world class facility.

(Laughter.)

MS. BROWN: And she has offered -- yes, and she has one of four world class facilities in the state, and has offered --

(Parties speaking simultaneously.)

MS. BROWN: -- and has offered that site, I might add, for the next meeting. So, throw that out. SMUD.

MR. BEEBE: That would be in Sacramento, SMUD.

COMMISSIONER BOYD: Is that all right for you southern Californians, who have never been --

UNIDENTIFIED SPEAKER: That's not south.

MS. BROWN: Well, there's always the July meeting.

(Parties speaking simultaneously.)

COMMISSIONER BOYD: We'll give you July then.

MS. BROWN: We'll give you the July meeting.

UNIDENTIFIED SPEAKER: Maybe we ought to hold it in DWP's headquarters.

(Laughter.)

MS. BROWN: Now there's a thought. Coal capital of the world.

MR. CAVANAGH: Not a world class facility.

(Parties speaking simultaneously.)

MS. BROWN: Do I hear a suggestion that we might take Ms. Schori and Bud up on their offer to have the next meeting at SMUD? Is that all right?

UNIDENTIFIED SPEAKER: Sure.

UNIDENTIFIED SPEAKER: That's wonderful.

UNIDENTIFIED SPEAKER: Sounds good to us.

MS. BROWN: Okay, and then the July meeting we'll move to the southland. Okay.

And then the other, the last point that I wanted, because it's my job to keep this going, the last point would be to have the subcommittee chairs take it upon themselves to consult with their committee members and give a subcommittee report at the next meeting on the top, you know, some possible policy recommendations which you, as a subcommittee, may wish to put forth to the entire group.

I think that would be a very wonderful assignment for this assemblage. So I will put that out as a suggestion. I see one nod from Ralph.

MR. CAVANAGH: On behalf of Ms. Schori.

(Laughter.)

(Parties speaking simultaneously.)

MS. BROWN: I'm putting you on the spot, Michael and Jason, I'm putting them on the spot. Come back with some suggested recommendations just to get our thought process going.

And I might also add the other thing that's happening is that the staff in the Energy Commission are on the hook to prepare a report this summer in the June timeframe for the Integrated Energy Policy Report on climate change.

And I see it as a wonderful vehicle to distribute to this group as what could be the makings of an Advisory Committee report, or at least something to spur that discussion along.

So that's something that we're on the hook to do anyway.

MR. PARKHURST: Susan, wasn't there a recommendation, I think Abby made, at the last meeting to -- or Josh, to start to develop an outline for the report?

MS. BROWN: We have it.

MR. PARKHURST: Oh, okay.

MS. BROWN: And I would like to circulate it.

MR. PARKHURST: Look forward to reading it.

MR. HELME: We'd love to have you do that.

MS. BROWN: In fact, we were just talking about that. We've been working on it. Josh Margolis, who couldn't be here today, and Abby and I have actually worked on an outline. And we just were waiting for the right time to surface it so that you all can provide input. So that is another thing.

COMMISSIONER BOYD: Josh suggested this so Josh gets to participate --

(Parties speaking simultaneously.)

MS. BROWN: So that is another thing that's in the works. And I'm actually using those wonderful ideas to guide the work of the Commission Staff on the work we're doing for the Integrated Energy Policy Report. So I do see an intersection of those processes, as Commissioner Boyd mentioned. It's the same topic area, the same subject matter, and we're certainly going to rely on the same analysis. So I'm seeing some cross-over issues here that will be very useful.

So, is there anything else we need to discuss, Commissioner Boyd, before closing today?

MS. YOUNG: I just wanted to mention that -- sorry, as I silence my phone -- I just wanted to mention that for the next four months I'm not going to be reachable via email, but I will be at the April meeting and reachable through Susan.

MS. BROWN: And we wish you well with your imminent birth of your second child. Which I really appreciate, so Abby is in contact.

MR. PARKHURST: With respect to the

California update, we haven't seen anything
recently from Cal-EPA. Have there been any
developments, or is that something that we might
be able to hear a little more about next time?

MS. BROWN: I'd like to --

UNIDENTIFIED SPEAKER: Eileen, would you
like to say something?

MS. BROWN: -- let Eileen respond, since
she's representing Cal-EPA.

MS. TUTT: Yeah.

(Parties speaking simultaneously.)

MS. TUTT: But that's a very good
question and we are working very hard on it. But
we can't really give you a timeline right now.
Sorry about that.

MS. TUTT: We're all -- on setting sort
of goals for California, moving California ahead.
And setting, you know, having more firm goals,
targets.

UNIDENTIFIED SPEAKER: Reduction goals?

MS. TUTT: Yeah, something like that.

UNIDENTIFIED SPEAKER: That's about as
vague as you can get.

(Laughter.)

MS. BROWN: And I'm sorry that Josh

wasn't here to hear that, because he would --

(Laughter.)

MR. PARKHURST: Do you think you'll have something by the next meeting?

MS. BROWN: It's certainly possible, isn't it?

MR. PARKHURST: Well, if I could make a request, we put a placeholder on that. If they've got it, great; if not, we'll look for it at the July meeting.

MS. YOUNG: We'll just assume it's 50 percent.

(Laughter.)

MS. BROWN: By when?

COMMISSIONER BOYD: Definitely if there's something it will be on the (inaudible) as we were anticipating maybe this meeting. But it didn't work out.

MR. PARKHURST: Okay.

MS. BROWN: I think that's all I have at this moment. We're going to do a debrief tomorrow and we will firm up our plans and get them out to --

MR. HERTEL: Will the next meeting be the first week in April? Can you tell us that much?

MS. BROWN: That was our hope. I have to consult with Commissioner Boyd's scheduling secretary and --

COMMISSIONER BOYD: Well, we need to consult with a lot of people's schedule, but we want it earlier in the month than later, yes.

MR. HERTEL: Even that would be appreciated.

MS. BROWN: Okay. Get it out to you as soon as we can. Okay.

COMMISSIONER BOYD: Okay, thank you, everybody. And, again, thanks to Wendy and PG&E for the use of the facility.

MS. BROWN: Yes, thank you.

(Applause.)

(Whereupon, at 3:50 p.m., the public meeting was adjourned.)

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CERTIFICATE OF REPORTER

I, PETER PETTY, an Electronic Reporter, do hereby certify that I am a disinterested person herein; that I recorded the foregoing California Climate Change Advisory Committee Public Meeting; that it was thereafter transcribed into typewriting.

I further certify that I am not of counsel or attorney for any of the parties to said public meeting, nor in any way interested in outcome of said public meeting.

IN WITNESS WHEREOF, I have hereunto set my hand this 31st day of January, 2005.